

***Sterling, Inc***  
***BP2400 SERIES GRANULATORS***  
**OPERATION AND MAINTENANCE MANUAL**



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**MACHINE DATA**

**MODEL** \_\_\_\_\_

**SERIAL NUMBER** \_\_\_\_\_

**CUMBERLAND CUSTOMER ORDER NUMBER** \_\_\_\_\_

**REFER TO THIS SHEET WHEN ORDERING PARTS.**

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**THANK YOU FOR PURCHASING AN STERLING BP2400 SERIES GRANULATOR.**

**READ THIS MANUAL** to learn how to operate and service your granulator safely. It covers the family of granulators called the BP2400. This series of Sterling Granulators is designed for the big jobs in reclamation of large blow-molded and thin walled, injection molded plastic parts as well as film.

This revision of the manual covers the improvements made since the introduction of the BP2400 Series Machines in 1993.

NOTE: This manual covers light maintenance only. No further maintenance should be performed without first contacting the Sterling Service Department at the mailing address and phone number shown on page 2.

When calling the factory for service information and parts, please have the model and serial number of your machine on hand. The serial number is stamped on the plate mounted on the center at the back of the granulator just below the hopper.

## INTRODUCTION

### WHAT IS A GRANULATOR?

**A GRANULATOR** is a machine that is designed to size-reduce plastic materials to chips or granulate. The machine can be fed either by hand through a hopper opening in the front or automatically from a special hopper opening, which can be specially designed.

**DISPOSAL OF THE PLASTIC GRANULATE** takes place after it passes through the screen and drops into the discharge area, where it is removed from the machine by a discharge blower and conveyed by air to a remote side of the machine. This discharge blower is available as optional equipment.

**THE GRANULATING OF PLASTIC** is achieved by the cutting action of sharp rotating knives in close adjustment to one or more stationary knives called bed knives. The rotary knife assembly is called a rotor. You will see the references to it as you read through this manual. There are two bed knives in the machines covered by this manual. The heavy-duty rotor and bed knife assemblies, combined with the screen (explained below) and their enclosing cutting chamber are the heart of the granulator.

**THE SIZE OF THE GRANULATE** resulting from the cutting action described is controlled by a screen, which fits tightly around the rotary knives in the cutting chamber. This screen retains the plastic granulate until it is reduced to a small enough size to fall through the holes in the screen. Screens with various hole sizes are available for the granulator. The standard screen hole size for the X-Series is 3/8" diameter. Screens are available with either smaller or larger hole sizes. For a given machine, the throughput capacity of the granulator is dependent upon the size of the screen utilized.

# SAFETY

## SECTION 1-1 Safety Symbols and Plates

### LEARN MACHINE SAFETY

Read this manual.

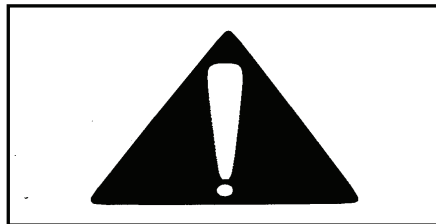
Learn how to operate and how to use the control.



DO NOT ALLOW ANYONE TO OPERATE THIS MACHINE WITHOUT PROPER INSTRUCTIONS.

THIS SAFETY alert symbol MEANS ATTENTION...BE ALERT!

YOUR SAFETY IS INVOLVED!



This symbol appears frequently in this manual and on your machine. It is used to alert you to the possibility of personal injury or death. Follow the instructions in the safety messages identified with this symbol.

UNDERSTAND THE SIGNAL WORDS....

A signal words such as – DANGER, WARNING OR CAUTION, is always used with the safety alert symbol to indicate the level of hazard. These safety words are in accordance with ANSI Z535.5.

**DANGER** identifies an imminently hazardous situation. Disregard of this hazard will result in severe personal injury or death. This signal word is printed over a red background.

**WARNING** identifies a potential hazard or unsafe practice. Disregard of this hazard could result in severe injury or death. This signal word is printed over a red background.

**CAUTION** identifies a potential hazard or unsafe practice. Disregard of this hazard to result in minor personal injury, product or property damage. This signal word may also be used to alert against unsafe practices. The signal word is printed over a yellow background.



# SAFETY

## SECTION 1-2

### Safety Symbols and Plates

#### FOLLOW THE SAFETY INSTRUCTIONS:

Read all safety messages in this manual and on your machine safety plates. Follow the recommended precautions and safe operating practices. Keep safety plates in good condition. Replace missing or damaged plates.



#### ROTATING KNIVES SAFETY PLATE

(Located below the infeed opening at the front of the machine)

DO NOT, UNDER ANY CIRCUMSTANCES, place your hands into the feed opening beyond the curtain while the machine is capable of running.

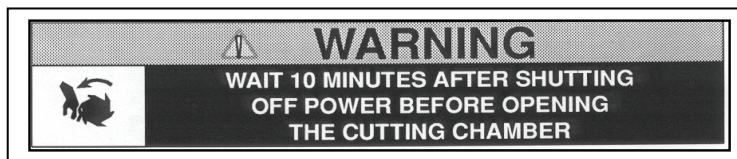
Disconnect and lock out all power when it becomes necessary to work beyond this point.

Make sure the rotor has come to a full stop before reaching through the curtain.



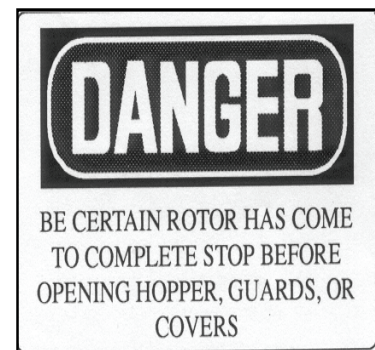
#### WARNING-PAUSE AFTER SHUT-DOWN (Located at the front of the cutting chamber)

Pause, as suggested, after shutting the machine down and locking out the power even though safety interlocks are in place to prevent injury. Develop good safety habits by adhering to the messages on all the warning plates. The best safety provision is your own careful concentration of safety.




#### OPENING HOPPER, GUARDS, COVERS SAFETY PLATE

(Located on the screen cradle on the front panel, left of the machine center.) The hopper, guards and safety covers are in place for your protection during machine operation. Be sure not to remove them until the rotor has come to a complete stop and you have disconnected and locked out all power. Be sure to replace all guards before reconnecting power.



# SAFETY

## SECTION 1-3 Safety Symbols and Plates

<p><b>ROTATING MACHINERY SAFETY PLATE</b> (One located on the machine guard on the left side of the machine, one on the screen cradle on the front panel, to the right of the machine center.)</p> <p>Avoid personal injury by making sure that the rotor is stopped and the power is disconnected and locked out before removing a machine guard.</p> <p>A motion sensor monitors the rotor and disables the jackscrew motors if there is rotor movement. If you see the rotor spinning after opening the machine, immediately shut down and call for service.</p>	 <p><b>DANGER</b></p> <p>ROTATING MACHINERY DISCONNECT AND LOCK OUT POWER BEFORE OPENING OR REMOVING GUARD</p>
<p><b>OPENING HOPPER SAFETY PLATE</b> (Located on center at the lower, front side of the hopper)</p> <p>Take the time for safety by disconnecting and locking out the power before opening the hopper. Work carefully and beware of all hazards with the hopper open and the knives exposed.</p>	 <p><b>DANGER</b></p> <p>ROTATING KNIVES DISCONNECT AND LOCK OUT POWER BEFORE OPENING HOPPER</p>
<p><b>ROTATING KNIVES SAFETY PLATE</b> (One located near the discharge port and one located near the vent port on each side of the machine.)</p> <p>Never reach into the vent or discharge areas without shutting down the machine and locking out the power. Wear protective gloves whenever you work around the rotor knives and do not open the access doors to them until you are certain that the rotor has stopped and you have disconnected and locked out the power. To clear a jam, refer to the topic entitled <b>Safely Clearing a Jam</b> later in this section.</p>	 <p><b>DANGER</b></p> <p>ROTATING KNIVES</p> <p>DO NOT PUT HANDS IN DISCHARGE AREA</p>
<p><b>WARNING SHEAR HAZARD</b> (Located on the right side of the machine near the zero speed sensor to the rear of the right rotor bearing housing)</p> <p>With the zero speed sensor removed, there is a potential hazard because the sensor probe extends into close proximity of the rotor. If you should place anything within this hole while the machine is running, the passing rotor would likely shear it off. In addition, without this component installed the safety interlock, which disables the jackscrew motors, is out of service, thus creating another serious safety hazard.</p>	 <p><b>WARNING</b></p> <p><b>SHEAR HAZARD</b></p> <p>KEEP FINGERS CLEAR OF SENSOR HOLE. DO NOT OPERATE WITHOUT SENSOR AND SHROUD IN POSITION.</p>

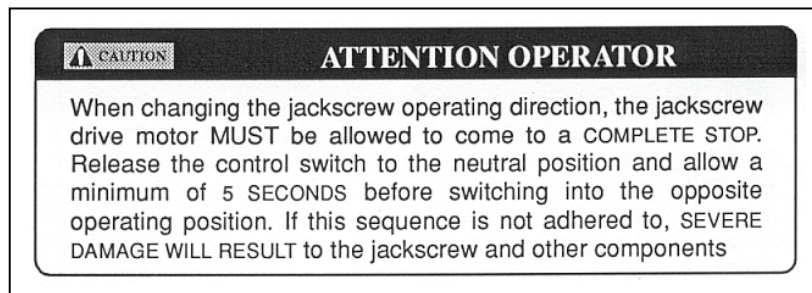
# SAFETY

## SECTION 1-4 *Safety Symbols and Plates*

### JACKSCREW REVERSING OPERATION

(Located on the jackscrew operating console)

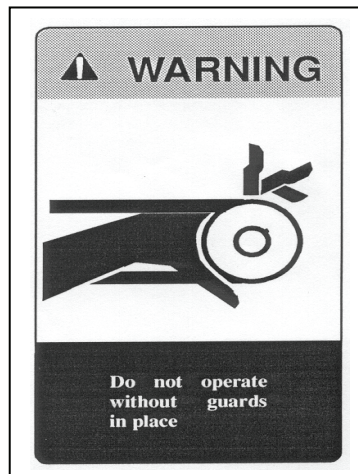
This information plate reminds you of the important procedure for reversing the direction of jackscrew operation. Be sure to pause as advised. This allows the jackscrew drive the necessary time to coast to a stop before reversing. Without this pause, the jackscrew may be severely damaged.



### GUARDS SAFETY PLATE

(Located on the drive guard cover on the left side as you face the machine)

By keeping the guards in place at all times you are promoting good safety practices and avoiding needless hazard and injury.





# SAFETY

## SECTION 1-5 Safety Symbols and Plates

### SAFETY INSTRUCTION PLATE

(Located on the front of the drive guard)

The safety instruction plate summarizes the most important safety rules that you need to operate this machine safely. Read it carefully and observe it always to promote safe machine operation.

### SAFETY INSTRUCTIONS

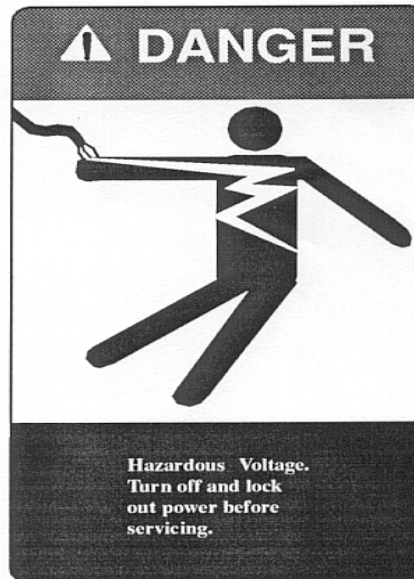
1. ONLY AUTHORIZED PERSONS MAY OPEN, CLEAN, OR SERVICE THIS MACHINE.
2. READ INSTRUCTION MANUAL BEFORE STARTING AND /OR SERVICING THIS MACHINE.
3. DISCONNECT AND LOCK OUT ELECTRICAL POWER BEFORE OPENING THIS MACHINE.
4. SAFETY INTERLOCKS MUST NOT BE BYPASSED.
5. DO NOT LOOSEN ANY FASTENER UNTIL MACHINE COMES TO A COMPLETE STOP.
6. OPERATOR MUST WEAR EYE PROTECTION.
7. OPERATOR MUST WEAR EAR PROTECTION WHEN NOISE EXPOSURE EXCEEDS OSHA STDS. SEC. 1910.95.

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### HAZARDOUS VOLTAGE SAFETY PLATE

(Located on the door of the jackscrew console)

Always call for the services of a licensed electrician when you think that there is an electrical problem. Never open any electrical panel if you are not a licensed electrician. Touching the wrong terminals may result in serious injury or death.



# SAFETY

## SECTION 1-6 Safety Symbols and Plates

### ROTATING KNIVES SAFETY PLATE

(One located on the front of the cutting chamber and one on the front of the cradle)

The rotating knives are razor-sharp to the touch. Always verify that the rotor is not moving. Avoid personal injury by making sure that the rotor is stopped and the power is disconnected and locked out before opening the machine. A motion sensor monitors the rotor and disables the hydraulic cylinder/jackscrew controls if there is movement. If you see the rotor spinning after opening the machine, immediately shut down the machine and call for service.

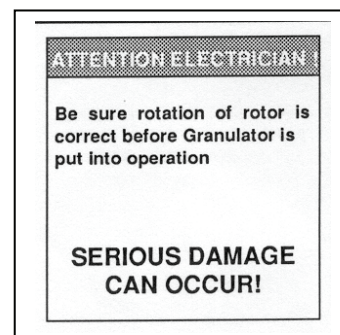
Wear protective gloves whenever you work around the rotor knives. To avoid jamming your fingers between the rotor knives and the bed knives, refer to the information for safely clearing a jammed cutting chamber later in this section.



### MOTOR ROTATION SAFETY PLATE

(Located on the door of the jackscrew console)

A REMINDER TO THE ELECTRICIAN to check the motor rotation. It is important to check the motor rotation whenever electrical connections to the motor are being made or have been disturbed for maintenance. The wrong rotation direction can cause personal injury (by throwing debris back toward the feed hopper opening) and/or by damaging the knives. NOTE: The drive motor direction arrow plate is located on the top surface of the drive guard toward the front of the machine.



# SAFETY

## SECTION 1-7 *Safety Clothing & Practices*

WEAR HEARING PROTECTION

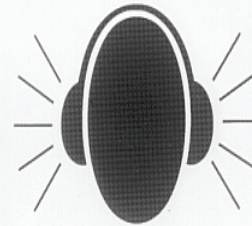


(Located above the infeed opening at the front of the machine)

It is recommended that hearing protection be used at all times when operating this equipment. It is mandatory that hearing protection be worn when noise exposure exceeds OSHA Standards Section 1910.95.

**CAUTION**

**WEAR HEARING PROTECTION WHEN USING THIS EQUIPMENT**



WEAR SAFETY GLASSES

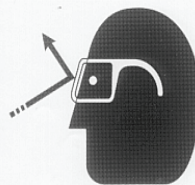


(Located above the infeed opening at the front of the machine)

Always wear proper eye protection when operating and/or servicing this equipment. Wear safety glasses with side shields or full-face safety shields.

**CAUTION**

**WEAR SAFETY GLASSES WITH SIDE DEFLECTORS WHEN USING THIS EQUIPMENT**

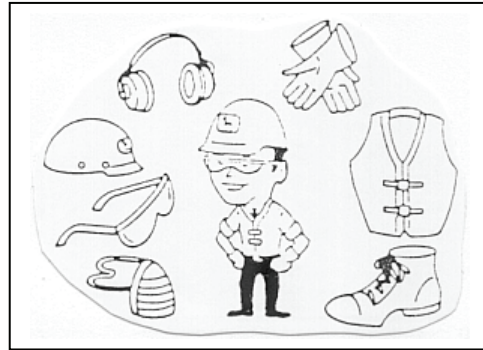


# SAFETY

## SECTION 1-8 *Safety Clothing & Practices*

### **WEAR PROTECTIVE CLOTHING**

Never wear neckties, dangling jewelry, loose-fitting clothing, watches, bracelets, or rings. Tie back long hair or restrain it with a hair net to ensure your safety.



### **KEEP YOUR WORK AREA SAFE**

Keep your work area clean and uncluttered. Store your maintenance tools away from the granulator to prevent them from falling into the machine and causing severe internal damage to the cutting chamber.

### **KEEP CO-WORKERS OFF THE MACHINE**

Never lean or rest on the granulator. Do not let co-workers lean on your machine while it is running. A moving part or shower of material may cause unexpected injury.

# SAFETY

## SECTION 1-9

### *Safety Clothing & Practices*

WORK SAFELY



**TURN OFF AND LOCKOUT** the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If it is not possible to lock out the power, have an electrician remove the fuses.

Make sure the rotor has come to a complete stop.

The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped.

If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Wear gloves to protect against injury from the rotor or bed knives.

### **MACHINE OPENING DEVICES**

The BP 2400 Series of granulators have been supplied with two different types of opening devices. These devices provide access to the Cutting Chamber for both the area above the rotor, mainly for cleaning/knife maintenance and below the rotor for cleaning/screen maintenance.

The system supplied on your machine may be either an electro-mechanical design (electric jackscrews) or of a hydraulic design (hydraulic cylinders & power supply). References to both systems appear throughout this manual. Be sure to follow the instructions that pertain to the system as supplied on your machine.

### **BE SURE THE ROTOR IS MOTIONLESS BEFORE OPENING MACHINE**

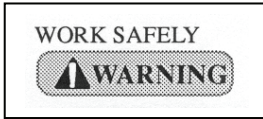
Never open or remove any machine components unless the motor is electrically locked out and the rotor is completely motionless.

The BP 2400 Series machine has a zero speed sensor that detects motion of the rotor. This sensor is inter-locked to the controls of the two hydraulic cylinders or jackscrews. If it detects motion in the rotor, it cuts the power to the hydraulic cylinder/jackscrew controls.

If you ever notice that the hydraulic cylinders or jackscrews operate while the rotor is turning, have a mechanic and electrician check the speed sensor per the procedure in Section 4, entitled Zero Speed Sensor.

# SAFETY

## SECTION 1-10 *Safely Cleaning A Jam*



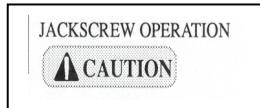
**TURN OFF AND LOCKOUT** the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If it is not possible to lock out the power, have an electrician remove the fuses.

Make sure the rotor has come to a complete stop.

The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped.

If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

### **OPEN THE CUTTING CHAMBER**

Open the screen cradle per instructions in Section 6-6 entitled Screen Replacement.

Open the cutting chamber per instructions in Section 6-9 entitled Cutting Chamber Access.

NEVER ATTEMPT TO FREE A JAMMED MACHINE BY PLACING YOUR HANDS ON THE ROTOR, ON THE KNIVES, OR INSIDE THE CUTTING CHAMBER.

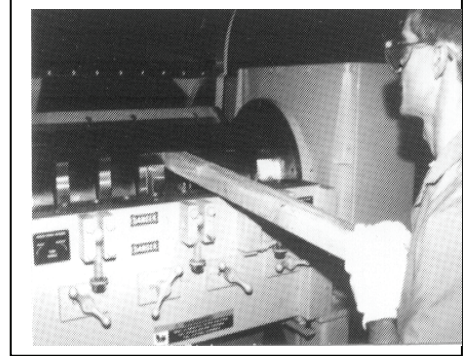
**KEEP YOUR HANDS CLEAR OF THE ROTATIONAL PATH OF THE ROTOR KNIVES.**

## SAFETY

### SECTION 1-11 *Safely Cleaning A Jam*

#### **CLEAR THE JAM**

- ✚ A leather mallet and block of wood of sufficient length to keep hands away from the path of the knives can be used if required.
- ✚ Use the block of wood to exert force on the rotor, usually in the direction opposite normal rotation.
- ✚ Make sure you have secure footing on a clean floor and keep your body well braced while prying on the rotor. Guard against loss of balance should the jammed condition suddenly come free.
- ✚ Use pliers to remove material from the cutting chamber, keep in mind that the removal of material may cause rotation of the rotor and rotor knives.
- ✚ If prying on the rotor is unsuccessful, remove the bed knife and the rotor knife at the jam. For information about bed knives, refer to Section 4, Settings and Adjustments.
- ✚ Close the screen cradle per instructions in Section 6-4 entitled Screen Replacement.
- ✚ Close the cutting chamber per instructions in Section 6-9 entitled Cutting Chamber Access.



#### MALFUNCTION CHECK



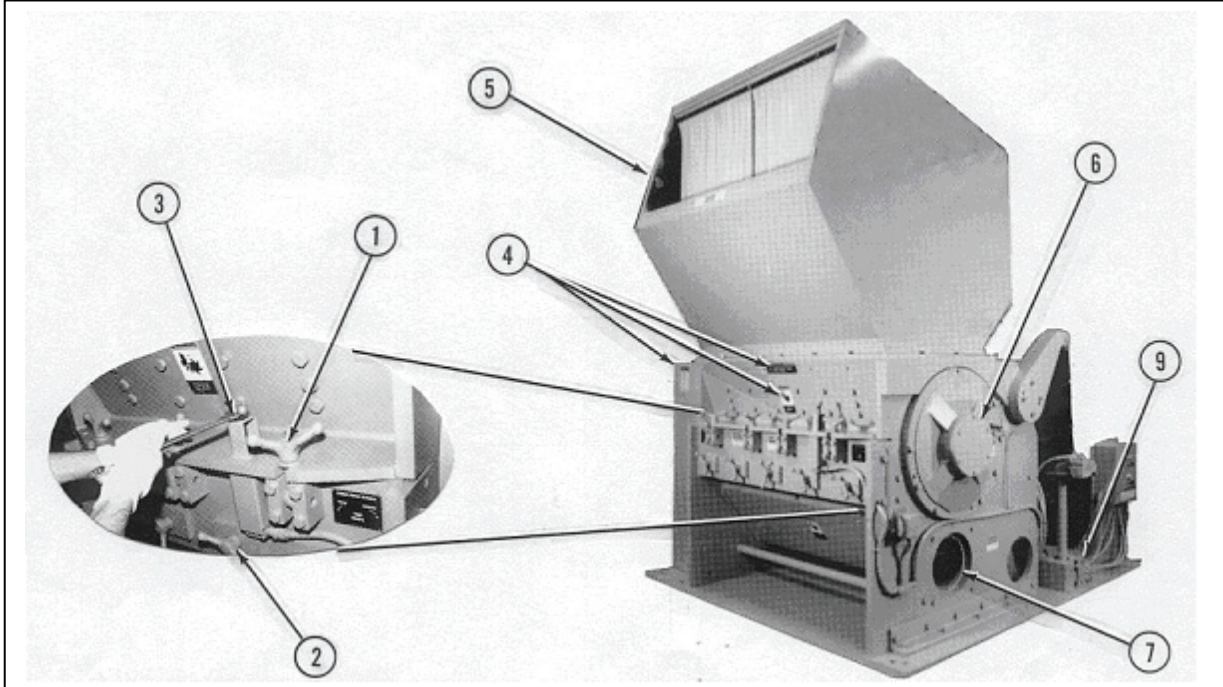
A malfunction of the machine, such as a jam, may cause undue strain or damage to any part. Do not restart the machine after such a malfunction without checking to see whether damage was done or whether settings were changed by the malfunction.

#### **RESTART THE GRANULATOR**

- ✚ If necessary to replace the fuses, call an electrician to do it.
- ✚ UNLOCK AND TURN ON the main power.
- ✚ Remove the OUT OF SERVICE tag
- ✚ Start the granulator by depressing the start pushbutton on the electrical cabinet.

## MACHINE AND CONTROLS

### SECTION 2-1



**BP 2400 Series Granulator -Left Front Quarter View**

1. Hold-down clamps - cutting chamber
2. Screen cradle retainers
3. Interlock actuator screw - cutting chamber
4. Safety plates
5. Feed hopper
6. Rotor bearing housing
7. Discharge duct (pipe not shown-optional mount to either side)
8. Start/stop pushbuttons are located on the electrical cabinet, not shown. (The electrical cabinet is optional equipment.)
9. Cover, mounting bracket limit switch, jackscrew opening only.

**BP 2400 Series Granulators** The BP 2400 Series Granulators have a common cutting diameter of 23.6"(600mm) and a common throat size of 24" (610mm) by widths ranging up to 56" (1420mm). They are designed for reclamation of large blow-molded and thin-walled injection molded-parts, films, and fibers.

The machines in the BP-Series can be fitted with screens having hole sizes to suit the particular application. The BP-Series machines conform to ANSI Standards: B 151.11 and NFPA 79.

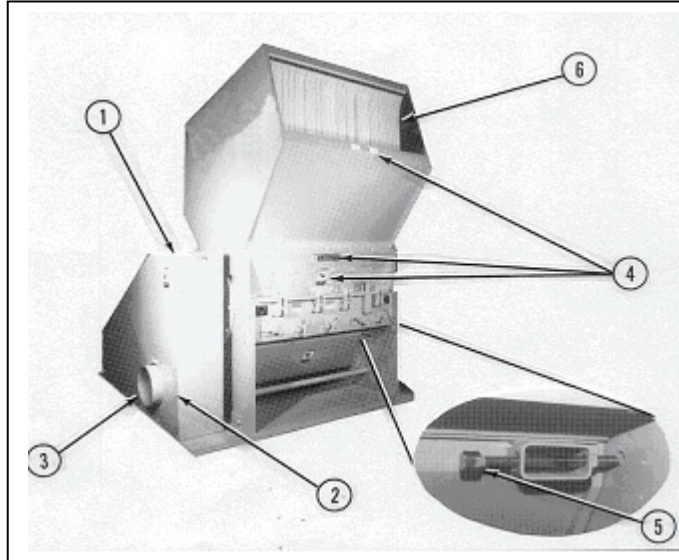


## MACHINE AND CONTROLS

### SECTION 2-2

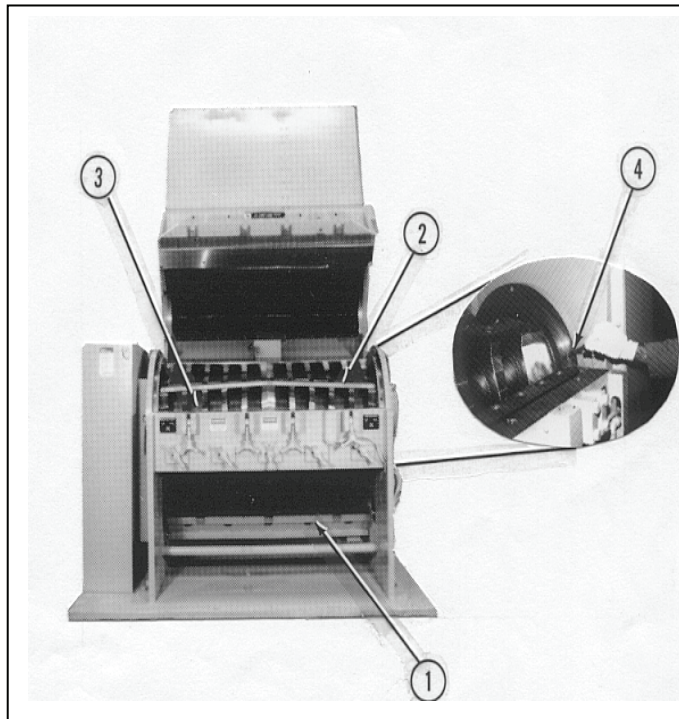
#### ***BP 2400 Series Granulator Right Front Quarter View***

1. Drive guard
2. Drive guard cover
3. Inlet vent -discharge blower
4. Safety plates
5. Interlock actuator screw screen cradle
6. Infeed flap



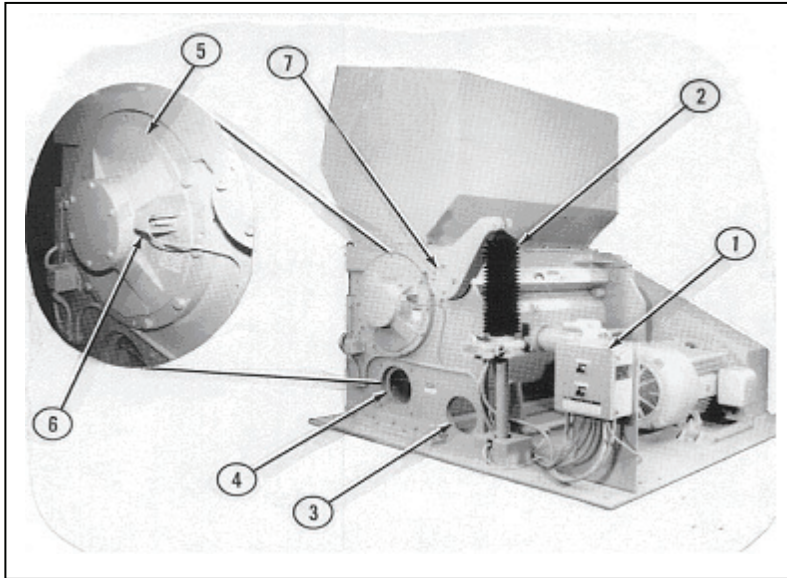
#### ***BP 2400 Series Granulator Machine Open Front View***

1. Screen
2. Rotor Knife
3. Bed knife (down stroke)
4. Rotor locating pin



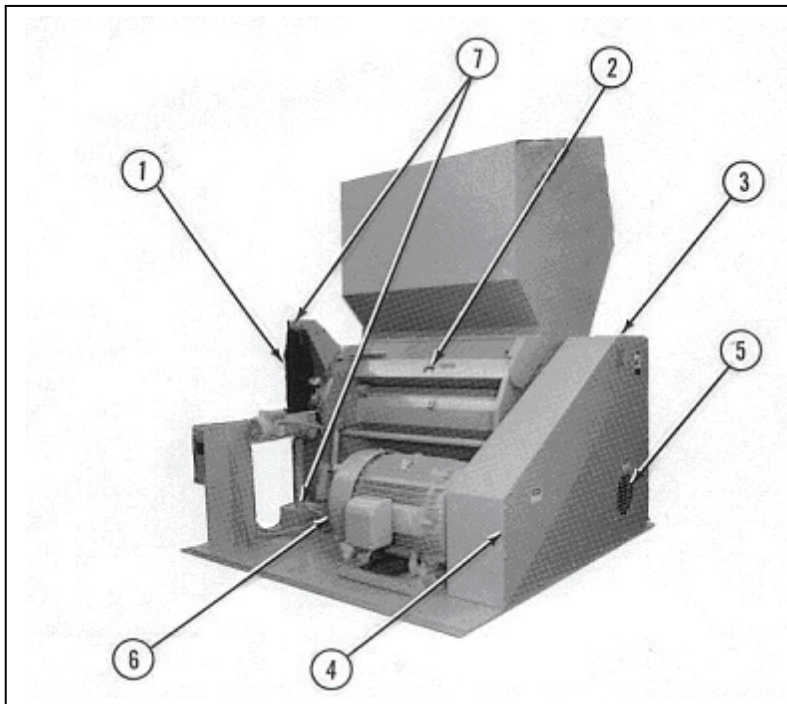
## MACHINE AND CONTROLS

### SECTION 2-3



**BP 2400 Series Granulator Left Rear Quarter View**

1. Hydraulic cylinder/ jackscrew console
2. Hydraulic cylinder or jackscrew- cutting chamber
3. Cleanout- discharge transition
4. Discharge outlet (pipe not shown-optional mount to either side)
5. Rotor bearing housing
6. Rotor zero speed sensor
7. Upper chamber pivot arm screws



**BP 2400 Series Granulator Right Rear Quarter View**









1. Hydraulic cylinder or jackscrew -cutting chamber
2. Machine serial number plate
3. Drive guard
4. Drive guard cover
5. Inlet vent, discharge blower
6. Drive motor
7. Hydraulic cylinder or jackscrew pivot pins and locknuts

# INSTALLATION

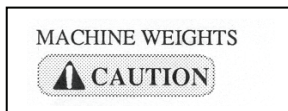
## SECTION 3-1

### OVERVIEW

This section deals with the procedures required to place your BP 2400 Series Granulator into service after you receive it at your plant. The following basic steps need to be accomplished.

-  Uncrating the machine
-  Accounting for all necessary parts
-  Inspecting for damage and reporting any damage to the carrier
-  Cleaning the protective coating from the machine
-  Moving the machine to its service location
-  Checking and, if necessary, adjusting mechanical parts before applying electrical power
-  Connecting electrical power to the machine control panel and hydraulic cylinder/jackscrew control panel located on the machine
-  Performing the start-up procedure





PLEASE FOLLOW THESE STEPS, AS OUTLINED TO ACHIEVE A SAFE AND SUCCESSFUL START- UP OF YOUR GP-SERIES GRANULATOR.



The machine weights for the BP-Series Granulators are as follows: BP 2428-10000 pounds  
BP 2439-13000 pounds  
BP 2456-16000 pounds

### UNCRATE THE GRANULATOR

As shipped, the granulator and the hopper are securely bolted onto separate skids and covered with a wooden crate. The electrical cabinet, an optional item, is similarly packaged when ordered.

-  Remove the strapping.
-  Remove the packages and parts from the skid or inner sides of the crate. Remove the hold-down bolts, nuts, etc.
-  Inspect for damage during transit and notify the carrier immediately of any damage.
-  Check the packing list and notify Sterling if there are any shortages.

## INSTALLATION

### SECTION 3-2

#### **MOVE THE GRANULATOR TO ITS WORK SITE**

If lifting the machine is necessary, use appropriately rated lifting equipment. Always lift the unit from beneath the base plate.

The machine weights for the BP-Series Granulators are as follows:

- BP 2428-10000 pounds
- BP 2439-13000 pounds
- BP 2456-16000 pounds

#### **ALLOW ADEQUATE WORK SPACE**

Adequate clearance must be maintained so that all areas of the granulator are accessible and unobstructed for servicing, maintaining, or operating the equipment. Space must be allowed for removing guards and screens.

Allow three feet (91 cm) on all sides of the machine for access.

#### **LEVEL THE GRANULATOR**

Once the granulator is at its final installation site, ensure that the machine is on a level surface and resting firmly on its base plate. If necessary, use shims to level it. It can be mounted on isolation pads or it can be lagged to the floor through holes provided in the base plate.



TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If it is not possible to lock out the power, have an electrician remove the fuses. Make sure the rotor has come to a complete stop.

(Continued on next page)

# INSTALLATION

## SECTION 3-3

WORK SAFELY







The hydraulic cylinders or jackscrews, which open the machine should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Wear gloves to protect against injury from the rotor or bed knives.

### **REMOVE THE PROTECTIVE COATING**

The machine is shipped with a protective wax coating, which must be removed prior to start-up. The coating can be removed with an acceptable solvent, such as mineral spirits.

-  Clean the following areas:
-  Inside the feed hopper
-  Inside the cutting chamber (knives, rotor, etc.)
-  Inside the discharge area.

CHECK THE KNIVES AND SCREENS



Be sure that the screens are properly installed into the cutting chamber and that nothing has fallen into the cutting chamber during transportation and/or installation. Refer to Section 6, Maintenance, for the procedure entitled Screen Replacement and Cutting Chamber Access. Check to be sure the bed knife and rotor knife hold-down screws are tight and knife clearances are correct. Refer to Section 4, Settings and Adjustments.

POWER CONSIDERATIONS



Before operating the granulator, it is extremely important that a licensed electrician correctly wires the machine into the plant power source. See Section 8, for wiring diagram.

All electrical equipment must be properly grounded in accordance with local and national codes to protect personnel from electrical shock.

A fusible, lockable disconnect between the plant power source and the machine electrical cabinet is highly recommended.

## INSTALLATION

### SECTION 3-4

#### **ELECTRICAL WIRING**

To wire the granulator, run power (of the proper voltage) from the plant source through a lockable, fusible disconnect to the machine electrical control panel.

To wire the jackscrew motors, run power (of proper voltage) from the plant source through a fusible disconnect to the machine-mounted jackscrew control panel.

From the main electrical control panel, make the necessary control circuit connections to the hydraulic cylinders/jackscrew control panel. Refer to the wiring diagrams supplied with the machine.

Wiring from the hydraulic cylinders/jackscrew console to the safety switches, zero speed sensor and hydraulic pump/valves or cutting chamber/screen cradle jackscrew is done at the factory.

From the main electrical panel, make the necessary wiring connections to the main drive motor and any auxiliary motors or control connections.

Refer to the wiring diagram appended to this manual for wiring connections for typical machine applications. Check the wiring diagram supplied for any wiring that is specific to your application. This diagram is part of the documentation shipped with the machine.



After power is connected, do not make any adjustments to the machine without performing the following operations.

TURN POWER OFF and LOCK IT OUT per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If you cannot lock out the power, have an electrician remove the fuses.

Tag the machine as OUT OF SERVICE.

Make sure the rotor has come to a complete stop.




The hydraulic cylinders/jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders/jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Wear gloves to protect against injury from the rotor or bed knives.



# INSTALLATION

## SECTION 3-5




### **CHECK FOR MECHANICAL INTERFERENCES**

-  TURN POWER OFF and LOCK IT OUT per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
-  Open the cutting chamber. Refer to the procedures entitled Screen Replacement and Cutting Chamber Access in Section 6.
-  Turn the rotor slowly with gloved hands, at least one full revolution, to verify that there are no interferences between the rotor knives and bed knives and/or with the screen.

### **SET UP THE MACHINE FUNCTIONS**

-  Set and torque the rotor knives and bed knives as shown in Section 4, Settings and Adjustments.
-  Adjust the V-belt drive per the procedure in Section 4 entitled Drive Belt Replacement or Adjustment

### **CHECK ROTATION OF MOTORS**

-  With the cutting chamber closed, jog the drive motor by pushing the start and stop buttons in quick succession. This starts and stops the granulator motor. Be alert for mechanical interferences between parts. Stop the machine immediately if you hear unexpected sounds.
-  Jog the motor to check the rotational direction. The V-belt sheave must rotate in the direction shown by the arrow located on top of the belt guard. Have a helper confirm the direction by looking at the V-belt through the viewing window on the side of the belt guard cover.
-  If your unit has the optional discharge blower located on either the right or left side of the machine, check the direction of rotation of the blower.

IF NECESSARY, REVERSE THE MOTOR ROTATION



It is extremely important that a licensed electrician performs these steps.  
If any motor rotates in the wrong direction, stop the machine by depressing the stop button.  
TURN OFF AND LOCK OUT the power at the disconnect switch which supplies power to the main electrical control panel per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources). If the disconnect is not lockable, remove the fuses.

(Continued on next page)

# INSTALLATION

## SECTION 3-6

IF NECESSARY, REVERSE THE MOTOR ROTATION



- ✚ With all power to the electrical control panel disconnected and locked out, reverse any two of the three power line conductors to the machine. If there is more than one motor on the machine, and one is turning in the wrong direction, and one isn't: reverse any two of the three line conductors at the overload relay of the motor that you wish to reverse.
- ✚ Unlock the power and switch it on at the electrical disconnect (if necessary, replace the fuses).
- ✚ Re-check the rotation direction of the motor(s).

### **INTERLOCK SWITCH TEST PROCEDURE**

With the machine stopped, perform the following steps.

- ✚ TURN OFF and LOCK OUT THE POWER per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
- ✚ Use the wiring diagram appended to this manual to locate the interlock switch terminal strip in the jack-screw control panel-
- ✚ The wires for the upper chamber interlock switch are numbers 1 and 16.
- ✚ The wires for the screen cradle interlock switch are numbers 16 and 5.
- ✚ Connect an ohmmeter across each interlock switch terminal or across all interlock switch terminals (wire numbers 1 and 5).
- ✚ Switch the ohmmeter resistance to the lowest scale.
- ✚ When the interlock actuator screws are in place and properly activating their switches, the ohmmeter should read zero resistance.
- ✚ When either or both actuator bolts are withdrawn, the ohmmeter should read infinite resistance.
- ✚ Loosen ONE actuator screw 3 to 4 turns.
- ✚ If the meter reads INFINITY, before the screw can be completely removed, the INTERLOCK IS WORKING.
- ✚ If the meter reads ZERO RESISTANCE when the actuator screw is completely REMOVED the interlock IS NOT working.
- ✚ REPLACE THE FIRST ACTUATOR SCREW TESTED BEFORE TESTING THE SECOND ONE. If an interlock does not work, the complete mechanism, including the switch, must be removed and disassembled to determine the cause of the malfunction.

### **ALTERNATE TEST FOR THE INTERLOCK SWITCHES**

With the cutting chamber and screen cradle closed and power on, perform the following steps.

- ✚ Push the start button to start the granulator.
- ✚ Retract the screen cradle interlock actuator screw by turning it counterclockwise. Make sure that the end of the actuator screw is visible and clear of any contact. The granulator should stop.
- ✚ If the machine continues to run, TURN OFF AND LOCK OUT THE POWER per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
- ✚ Have the electrician check the interlock switch on the screen cradle to correct the malfunction.



# INSTALLATION

## SECTION 3-6

IF NECESSARY, REVERSE THE MOTOR ROTATION



- ✚ With all power to the electrical control panel disconnected and locked out, reverse any two of the three power line conductors to the machine. If there is more than one motor on the machine, and one is turning in the wrong direction, and one isn't: reverse any two of the three line conductors at the overload relay of the motor that you wish to reverse.
- ✚ Unlock the power and switch it on at the electrical disconnect (if necessary, replace the fuses).
- ✚ Re-check the rotation direction of the motor(s).

### **INTERLOCK SWITCH TEST PROCEDURE**

With the machine stopped, perform the following steps.

- ✚ TURN OFF and LOCK OUT THE POWER per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
- ✚ Use the wiring diagram appended to this manual to locate the interlock switch terminal strip in the jack-screw control panel-
- ✚ The wires for the upper chamber interlock switch are numbers 1 and 16.
- ✚ The wires for the screen cradle interlock switch are numbers 16 and 5.
- ✚ Connect an ohmmeter across each interlock switch terminal or across all interlock switch terminals (wire numbers 1 and 5).
- ✚ Switch the ohmmeter resistance to the lowest scale.
- ✚ When the interlock actuator screws are in place and properly activating their switches, the ohmmeter should read zero resistance.
- ✚ When either or both actuator bolts are withdrawn, the ohmmeter should read infinite resistance.
- ✚ Loosen ONE actuator screw 3 to 4 turns.
- ✚ If the meter reads INFINITY, before the screw can be completely removed, the INTERLOCK IS WORKING.
- ✚ If the meter reads ZERO RESISTANCE when the actuator screw is completely REMOVED the interlock IS NOT working.
- ✚ REPLACE THE FIRST ACTUATOR SCREW TESTED BEFORE TESTING THE SECOND ONE. If an interlock does not work, the complete mechanism, including the switch, must be removed and disassembled to determine the cause of the malfunction.

### **ALTERNATE TEST FOR THE INTERLOCK SWITCHES**








With the cutting chamber and screen cradle closed and power on, perform the following steps.

- ✚ Push the start button to start the granulator.
- ✚ Retract the screen cradle interlock actuator screw by turning it counterclockwise. Make sure that the end of the actuator screw is visible and clear of any contact. The granulator should stop.
- ✚ If the machine continues to run, TURN OFF AND LOCK OUT THE POWER per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
- ✚ Have the electrician check the interlock switch on the screen cradle to correct the malfunction.

## INSTALLATION








### SECTION 3-7

#### **ALTERNATE TEST FOR THE INTERLOCK SWITCHES** (Continued from previous page).

-  After the test or repair, engage the screen cradle interlock actuator screw.
-  If necessary, unlock and turn on the power.
-  Push the start button to start the granulator.
-  Retract the cutting chamber interlock actuator screw by turning it counterclockwise. Make sure that the end of the actuator screw is visible and clear of any contact. The granulator should stop.
-  If the machine continues to run, **TURN OFF AND LOCK OUT THE POWER** per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
-  Have the electrician check the interlock switch on the cutting chamber to correct the malfunction.
-  After the test or repair, if necessary, engage the cutting chamber interlock actuator screw.

#### **TEST THE ZERO SPEED SENSOR**

##### **Cutting Chamber Jackscrew**

-  Depress the start button to start the granulator.
-  When the machine reaches full speed, depress the stop button to stop the granulator.
-  Open the cutting chamber interlock using the procedure in Section 6 entitled Cutting Chamber Access.
-  Release the cutting chamber hold-down clamps using the procedure in Section 6 entitled Cutting Chamber Access.
-  While the rotor is still turning, actuate the cutting chamber hydraulic cylinder or jackscrew from the control console by turning the CC/Hopper selector switch to the **RAISE POSITION**.
-  The hydraulic cylinder or jackscrew should **NOT** operate until the rotor has come to a complete stop.
-  If the hydraulic cylinder or jackscrew operates before the rotor stops, **TURN OFF AND LOCKOUT THE POWER** per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).








## INSTALLATION

### SECTION 3-8

#### **TEST THE ZERO SPEED SENSOR**

{Continued from previous page}

##### Screen Cradle Jackscrew

-  Push the start button to start the granulator
-  When the machine reaches full speed, push the stop button to stop the granulator.
-  Open the screen cradle interlock using the procedure in Section 6-4 entitled Screen Replacement.
-  Release the cradle retainers using the procedure in Section 6-9 entitled Screen Replacement.
-  While the rotor is still turning, actuate the screen cradle hydraulic cylinder or jackscrew from the control console by turning the CC/screen cradle selector switch to the LOWER POSITION.
-  The hydraulic cylinder or jackscrew should NOT operate until the rotor has come to a complete stop.
-  If the hydraulic cylinder or jackscrew operates before the rotor stops, **TURN OFF AND LOCKOUT THE POWER** per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

#### **LUBRICATION**

The machine is pre-lubricated except for the motor. For motor lubrication, check the tag supplied by the motor manufacturer.

After the BP2400 Series Granulator has been in service for some time, the jackscrews and the main bearings should be lubricated periodically.






Refer to Section 6, Maintenance, for further information.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-1

#### *Adjusting or Replacing Bed Knives*

##### **BASIC FACTS ABOUT THE KNIVES**

-  All of the rotor knives are ground in sets to equal dimensions. Mount and service them as sets.
-  The rotor knives must be mounted tightly against the backs of the knife seats, in order to make it possible to achieve consistent knife clearances.
-  Rotors with adjustable rotor knives require setting of the knife length prior to installation on to the rotor. Knife length setting is accomplished by using the fixture supplied with the machine, see Section 4-35.
-  Accurate cutting clearance is obtained by setting the bed knives to a 0.006 in. to 0.008 in. (0.15 mm to 0.20 mm) gap from the rotor knives.
-  The bed knives are adjusted by turning captive adjusting screws. For best results, start with the bed knives adjusted to a wide gap from the rotor knife, and slowly adjust them to the required gap by turning the screws in the same direction; avoid reversals. Reversals introduce inaccuracies due to backlash.

##### **CHECK ALL SETTINGS AND ADJUSTMENTS BEFORE GRANULATING ANY MATERIAL**

Proper adjustments and settings are made prior to shipment, however the machine may require readjustment. The standard knife gap setting is between six and eight thousandths of an inch (0.006 in. to 0.008 in. or 0.15 mm to 0.20 mm).

NOTE: These instructions apply to both the upstroke (the bed knife furthest from you when you service the cutting chamber) and the down-stroke bed knives.

##### MALFUNCTION CHECK



A malfunction of the machine, such as a jam, may cause undue strain or damage to any part. Do not restart the machine after such a malfunction without checking to see whether damage was done or whether settings were changed by the malfunction.

##### WORK SAFELY



TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If it is not possible to lock out the power, have an electrician remove the fuses. Make sure the rotor has come to a complete stop.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-2

#### *Adjusting or Replacing Bed Knives*

WORK SAFELY






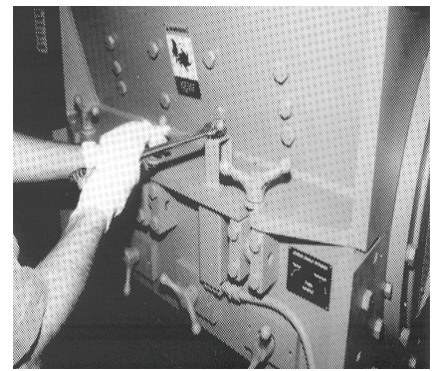
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The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.



Wear gloves to protect against injury from the rotor or bed knives.

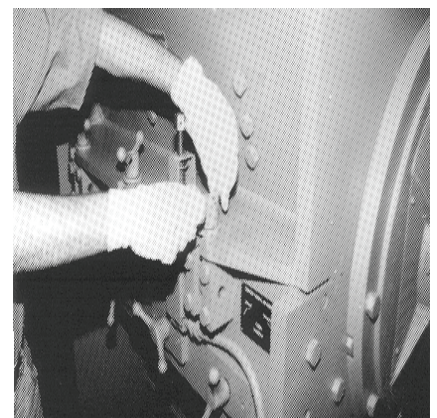
#### **OPEN THE CUTTING CHAMBER INTERLOCK**

-  Disengage the interlock actuator screw with a box wrench or a ratchet wrench.
-  Make sure the end of the interlock actuator screw is visible and clear of any contact.
-  When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.



#### **RELEASE THE CUTTING CHAMBER FASTENERS**

-  Turn the hold-down clamps counterclockwise to loosen them.
-  Swing the hold-down clamps toward you until they are disengaged from the cutting chamber housing.



**SEE SECTION 6-10 PAGE 87 FOR CUTTING CHAMBER OPENING INSTRUCTIONS.**

## SETTINGS AND ADJUSTMENTS

### SECTION 4-3

#### *Adjusting or Replacing Bed Knives*

CARE IN HANDLING KNIVES





The rotor knives and bed knives are very sharp wear heavy gloves to avoid injury.

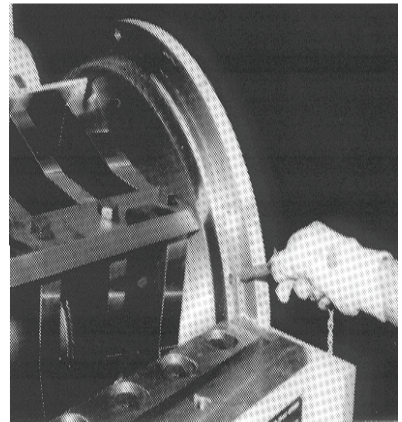
Use the rotor-locating pin to lock the rotor in the position that is least likely to cause injury as you work. The pin keeps the rotor from turning.

If the rotor knives and the bed knives are to be removed, remove the rotor knives first (and replace them last) to reduce the chance of injury.

#### **INSTALL THE ROTOR LOCATING PIN**

-  Insert the rotor-locating pin into the hole in the right side of the bearing housing.
-  While applying light pressure, turn the rotor pin until the pin drops deeper into the locating hole. The pin keeps the rotor from turning while the pin is in place.

**NOTE:** The locating pin allows you to engage several hole locations so that you can position the knives in the least hazardous position.



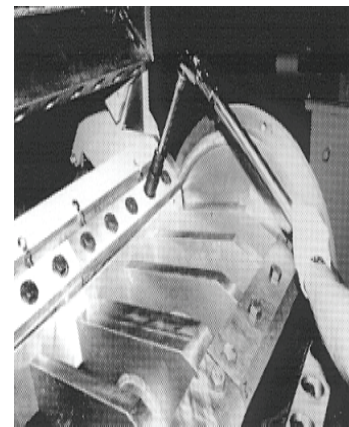
## SETTINGS AND ADJUSTMENTS

### SECTION 4-4

#### *Adjusting or Replacing Bed Knives*

#### **LOOSEN THE MOUNTING SCREWS**

- ✚ Select either the upstroke knife or the down-stroke knife for first removal.
- ✚ Loosen the bed knife screws with a 30 mm socket mounted on a breaker bar. These screws are tightened to a torque of 472 ft lbs (640 Nm) so make sure you have the proper breaker bar (a four foot long (1.2 m) bar with a 3/4 inch (19 mm) drive is suggested). Make sure you have solid footing while you apply the breaking force.

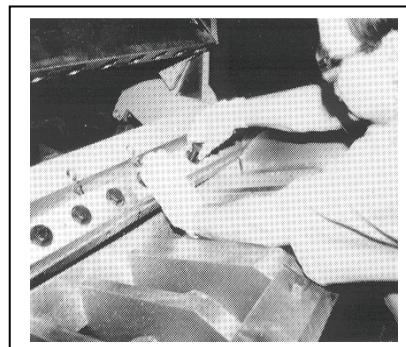


#### **REMOVE THE FIRST KNIFE CLAMP OR SHIELD**

- ✚ Remove the screws on one half of the selected bed knife using a 30 mm socket or equivalent wrench.

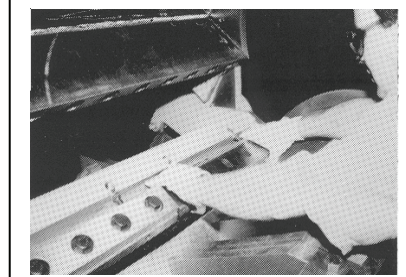
NOTE: When removing the knife clamp on the upstroke knife (the similar piece on the down-stroke knife is called knife shield), hold the clamp while removing the last screw to keep it from slipping off its inclined mounting surface. The knives will not slip off because they are, secured by the captive adjusting screws.

- ✚ Keep the screws for reinstallation or use new factory-supplied screws of the same specification for replacement.
- ✚ Repeat the removal procedure for the remaining knife clamps and shields.



#### **REMOVE THE BED KNIVES**

- ✚ Remove the bed knives by lifting each half until the captive screws are clear of their slots.
- ✚ Remove the second bed knife using the same procedure.



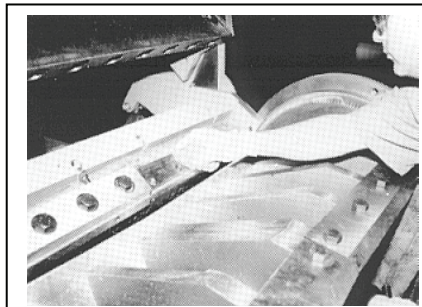
## SETTINGS AND ADJUSTMENTS

### SECTION 4-5

#### *Adjusting or Replacing Bed Knives*

#### **CLEAN THE KNIFE MOUNTING SURFACES**

- ✚ Clean the knife mounting surfaces with a stone or other non-marring tool and wipe them with a clean cloth.
- ✚ Make sure they are free of all material, dust, and dirt.



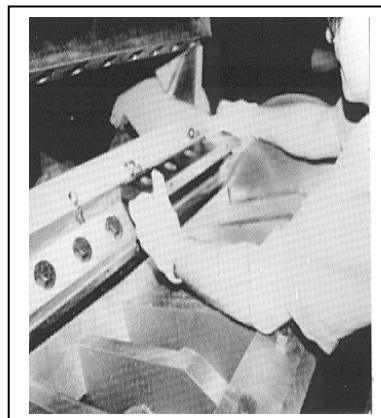
#### **MOUNTING SCREWS**



**DO NOT REPLACE THE MOUNTING SCREWS WITH ANY TYPE OF SCREW OTHER THAN THAT SPECIFIED BY CUMBERLAND.** Substitution of improper screws could lead to premature failure, equipment damage, and serious injury to personnel. When regrinding the knives, you may re-use the same screws and washers but do not re-use them more than six times. When installing new knives, replace the screws and washers with those furnished by the factory.

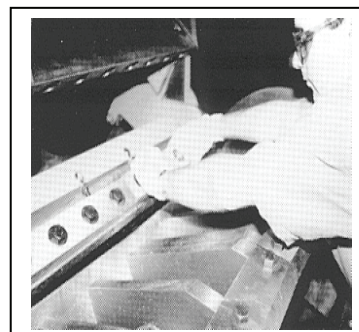
#### **REPLACE THE UPSTROKE BED KNIFE**

- ✚ Wipe the screws with a lightly oiled cloth; do not leave an oil film since lubrication can adversely affect the stress on a screw installed to a fixed torque.
- ✚ Install the upstroke knife making sure to install it with the knife-edge on the lower side.
- ✚ Engage the captive screws in the slots on the far side of the knife bed and lower the knife onto the knife bed-
- ✚ Repeat these steps for the second half of the knife.



#### **REPLACE THE UPSTROKE KNIFE CLAMP**

- ✚ Place the clamp over one half of the knife and hold it in position until you fasten the first two screws and washers finger-tight.
- ✚ Place the second clamp over the second half of the knife and hold it while you fasten it.
- ✚ Install the remaining mounting screws and washers and tighten them finger-tight.








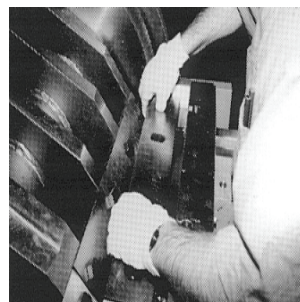
## SETTINGS AND ADJUSTMENTS

### SECTION 4-6




#### *Adjusting or Replacing Bed Knives*

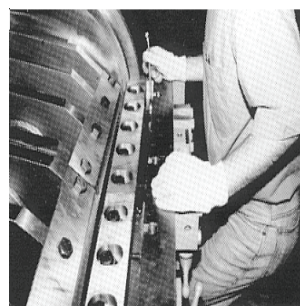
#### **REPLACE THE DOWNSTROKE BED KNIFE**

-  Install the down-stroke bed knife (located on the near side of the rotor) making sure to install it with the knife-edge on the upper side.
-  Engage the captive screws in the slots on the near side of the knife bed and lower the knife onto the knife bed.
-  Repeat these steps for the second half of the down-stroke knife.





#### **REPLACE THE DOWNSTROKE KNIFE SHIELDS**

-  Back off the captive screws on both halves of the bed knife so that they will not interfere with the rotor.
-  Place the shields over the bed knife.
-  Install the mounting screws and washers and tighten them finger-tight.



#### **CHECK THE BED KNIVES**

-  Check both halves of the upstroke knife (the bed knife on the far side of the rotor) to be sure that the cutting edges face down.
-  Check both halves of the down-stroke knife (the bed knife on the near side of the rotor) to be sure that the cutting edges face up.

#### **GAP ADJUSTMENT TIPS**

It is best to keep the adjustments on the captive screws moving in the same direction. This eliminates the effect of backlash in the adjusting screw.

Make the screw adjustments in small steps to keep the bed knife adjustment even over the width of the machine.

To avoid cutting the shim stock, turn the rotor backward during the adjustment procedure.

Use the rotor knife with the largest dimension from rotor centerline as the reference, i.e., the highest knife.

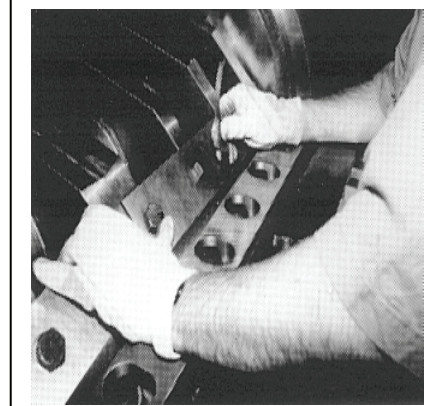
## SETTINGS AND ADJUSTMENTS

### SECTION 4-7

#### *Adjusting or Replacing Bed Knives*

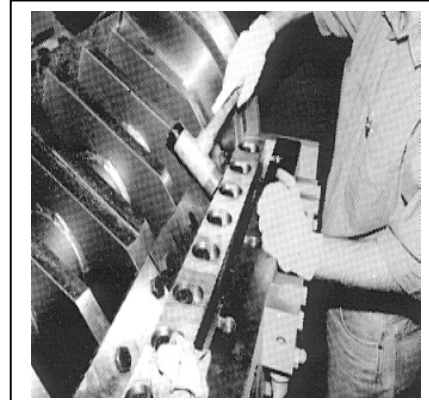
#### **MEASURE THE KNIFE GAP**

- ✚ If you are changing the rotor knives, do that now, otherwise, continue with this procedure.
- ✚ Use brass shim stock to set the knife gap to the cutting clearance of 0.006 in. to 0.008 in. (0.15 mm to 0.20 mm).
- ✚ Remove the rotor-locating pin.
- ✚ Rotate the rotor backward, by hand, and measure the gap between it and the bed knife at the point of shear. You can work on each half of the bed knife independent of the other half but keep them in step with each other by working from side-to-side.



#### **SET THE DOWNSTROKE KNIFE SHIELD**

- ✚ Position the knife-shield so that it sets back from the bed knife-edge about 1/32 in. for film and 1/16 in. for thicker materials. Use a plastic or leather mallet, if necessary, to tap the shield or knife-
- ✚ The upstroke knife clamp does not need this adjustment.
- ✚ Carefully adjust the bed knife clearance to its final setting and snug down the mounting screws with a 30 mm socket wrench.



#### **CHECK THE KNIFE GAP**

- ✚ Snug the screws down in stages keeping them about even as you progressively tighten them. Recheck the knife gap after snugging down the mounting screws.
- ✚ After setting up to one rotor knife (usually the highest knife), rotate the remaining knives slowly by the bed knife and quickly verify the knife gap.

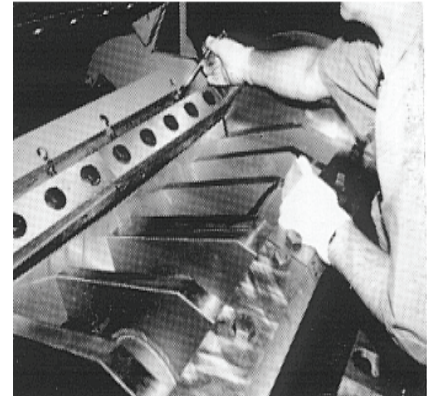
## **SETTINGS AND ADJUSTMENTS**

### **SECTION 4-8**

#### *Adjusting or Replacing Bed Knives*

#### **TIGHTEN THE SCREWS TO FINAL TORQUE**

- ✚ When the knife gap is adjusted to the proper dimension, tighten the mounting screws to a torque of 472 ft lbs (640 Nm).
- ✚ For safety, make sure that you have solid footing when you apply this final torque.
- ✚ Recheck the gap after tightening the screws to the final torque.
- ✚ Make sure that both halves of the bed knife are adjusted.



#### **FINALIZE INSTALLATION OF UPSTROKE BED KNIFE**

To complete the installation of the upstroke bed knife, use the same procedures as for the down-stroke knife. The titles follow:

- ✚ Measure the knife gap.
- ✚ Unlike the knife shield, the knife clamp does not need to be adjusted.
- ✚ Check the knife gap.
- ✚ Tighten the screws to final torque.

**SEE SECTION 6-11 PAGE 88 FOR CUTTING CHAMBER CLOSING INSTRUCTIONS.**

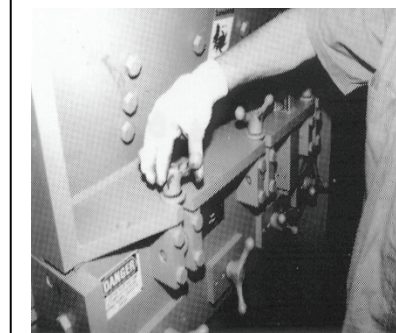
## SETTINGS AND ADJUSTMENTS

### SECTION 4-9

#### *Adjusting or Replacing Bed Knives*

#### **FASTEN THE CUTTING CHAMBER**

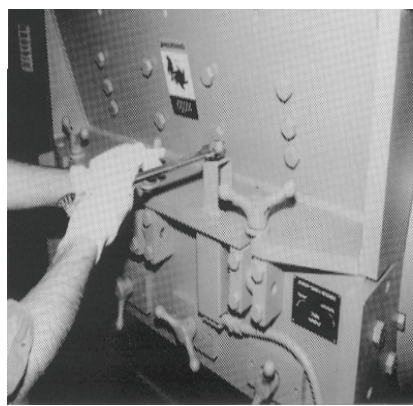
- ✚ Raise the hold-down clamps to their upright positions
- ✚ Turn the knobs clockwise until they are tight against the chamber housing.



#### **CLOSE THE CUTTING CHAMBER SAFETY INTERLOCK**

- ✚ Engage the safety interlock by turning the actuator screw clockwise with a box wrench or a ratchet wrench
- ✚ Make sure the screw is fully seated against the top surface of its housing.

When engaged, the interlock closes the electrical control circuit to the motor and allows the machine to run.



#### **RESTART THE GRANULATOR**






- ✚ If necessary to replace the fuses, call an electrician to do it.
- ✚ UNLOCK AND TURN ON the main power.
- ✚ Remove the OUT OF SERVICE tag.
- ✚ Start the granulator by depressing the start pushbutton on the electrical cabinet.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-10






#### *Adjusting or Replacing Rotor Knives*

#### **BASIC FACTS ABOUT THE KNIVES**

-  All of the rotor knives are ground in sets to equal dimensions. Mount and service them as sets. .
-  The rotor knives must be mounted tightly against the backs of knife seats in order to make it possible to achieve consistent knife clearances.
-  Rotors with adjustable rotor knives require setting of the knife length prior to installation on to the rotor. Knife length setting is accomplished by using the fixture supplied with the machine, see Section 4-35.
-  Accurate cutting clearance is obtained by setting the bed knives to a 0.006 in. to 0.008 in. (0.15 mm to 0.20 mm) gap from the rotor knives.
-  The bed knives are adjusted by turning captive adjusting screws. For best results, start with the bed knives adjusted to a wide gap from the rotor knife, and slowly adjust them to the required gap by turning the screws in the same direction; avoid reversals. Reversals introduce inaccuracies due to backlash.

#### **WORK SAFELY**



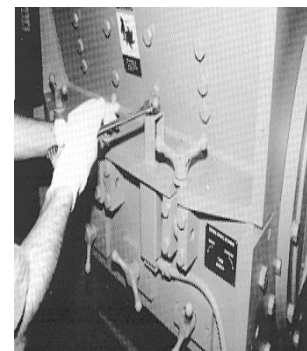
-  **TURN OFF AND LOCKOUT** the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
-  If it is not possible to lock out the power, have an electrician remove the fuses.
-  Make sure the rotor has come to a complete stop.
-  The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews **DO** operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.
-  Wear gloves to protect against injury from the rotor or bed knives.

#### **OPEN THE CUTTING CHAMBER INTERLOCK**

Disengage the interlock actuator screw with a box wrench or a ratchet wrench.

Make sure the end of the interlock actuator screw is visible and clear of any contact.

When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.





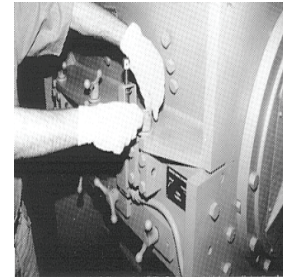
## **SETTINGS AND ADJUSTMENTS**

### **SECTION 4-11**

#### *Adjusting or Replacing Rotor Knives*

#### **RELEASE THE CUTTING CHAMBER FASTENERS**

-  Turn the hold-down clamps counterclockwise to loosen them.
-  Swing the hold-down clamps toward you until they are disengaged from the cutting chamber housing.



**SEE SECTION 6-10 PAGE 87 FOR CUTTING CHAMBER  
OPENING INSTRUCTIONS.**

## SETTINGS AND ADJUSTMENTS

### SECTION 4-12

#### *Adjusting or Replacing Rotor Knives*

CARE IN HANDLING KNIVES







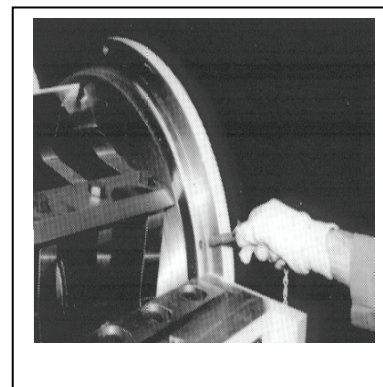
The rotor knives and bed knives are very sharp wear heavy gloves to avoid injury.

Use the rotor-locating pin to lock the rotor in the position that is least likely to cause injury as you work. The pin keeps the rotor from turning.



If the rotor knives and the bed knives are to be removed, remove the rotor knives first (and replace them last) to reduce the chance of injury.

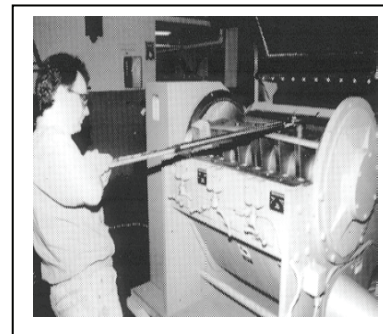
#### **LOCK THE ROTOR**

-  Position the rotor so that a blade is at top dead center.
-  Insert the rotor-locking pin into the hole in the right side bearing housing.
-  Apply light pressure against the pin while turning the rotor toward you approximately 10 degrees. The pin will drop into the hole when it is properly aligned.
-  The pin locks the rotor in place until the pin is removed.





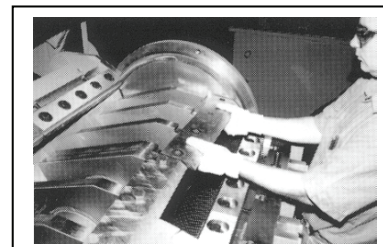
#### **REMOVE THE MOUNTING SCREWS**

-  Loosen the rotor knife screws with a 30 mm socket mounted on a breaker bar (These screws are tightened to a torque of 472 ft lbs (640 Nm) so make sure you have the proper breaker bar (a four foot long (1.2 m) bar with a 3/4 inch (19 mm) drive is suggested. Make sure you have solid footing while you apply the breaking force.
-  Remove the mounting screws from the right rotor knife with a suitable socket wrench.



#### **REMOVE THE ROTOR KNIVES**

-  Lift the right knife off from the rotor and repeat the process with the left rotor knife.
-  Remove the rotor-locating pin, turn the rotor to bring the next knives into position for removal, insert the locating pin to hold the rotor in this position. Repeat the process for the remaining knives.



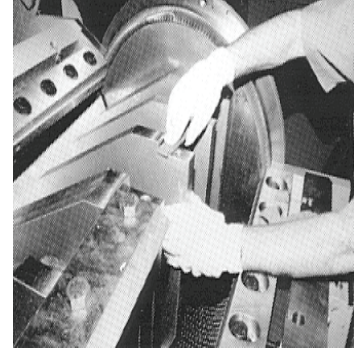
## SETTINGS AND ADJUSTMENTS

### SECTION 4-13

#### *Adjusting or Replacing Rotor Knives*

#### **CLEAN PARTS FOR REASSEMBLY**

- ✚ Clean the rotor knife seats with a stone or other non-mar-ring tool. Make sure that the backs of the knife seats are clean so that the rotor knife can be placed squarely against them.
  
- ✚ Wipe the screws with lightly oiled cloth, do not leave an oil film since lubrication can adversely affect the stress on a screw installed to a fixed torque value.



#### MOUNTING SCREWS



**DO NOT REPLACE THE MOUNTING SCREWS WITH ANY TYPE OF SCREW OTHER THAN THAT SPECIFIED BY STERLING.** Substitution of improper screws could lead to premature failure, equipment damage, and serious injury to personnel.

When regrinding the knives, you may re-use the same screws and washers but do not re-use them more than six times. When installing new knives, replace the screws and washers with those furnished by the factory.

#### **ROTORS WITH REPLACEABLE KNIFE SEATS**

- ✚ Check the replaceable knife seat screws for proper torque.
  
- ✚ The proper torque value for these screws is 235 ft lbs.
  
- ✚ This should be carried out at regular set maintenance intervals.



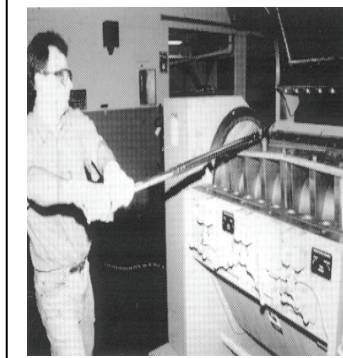
## SETTINGS AND ADJUSTMENTS

### SECTION 4-14

#### *Adjusting or Replacing Rotor Knives*

#### **TIGHTEN THE ROTOR KNIVES TO FINAL TORQUE**

- ✚ Use a 30 mm socket wrench to tighten the mounting screws on each knife in small steps keeping them about even as you increase the torque on them.
- ✚ Use a torque wrench to apply the final torque of 472 ft lbs (640 Nm) to the mounting screws. Make sure your footing is secure before you apply the final torque.
- ✚ Check with a 0.0015" (0.04 mm) feeler gage to ensure that each knife is snug against the knife seat.



#### **CHECK THE BED KNIVES**

If the bed knives have been removed, check them as follows:

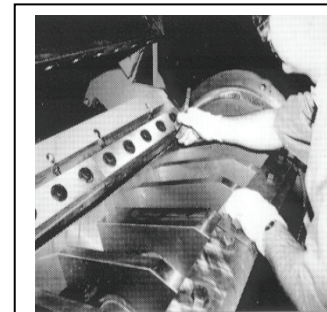
- ✚ Check both halves of the upstroke knife (the bed knife on the far side of the rotor) to be sure that the cutting edges face down.
- ✚ Check both halves of the down-stroke knife (the bed knife on the near side of the rotor) to be sure that the cutting edges face up.

#### **GAP ADJUSTMENT TIPS**

- ✚ It is best to keep the adjustments on the captive screws moving in the same direction. This eliminates the effect of backlash in the adjusting screw.
- ✚ Make the screw adjustments in small steps to keep the bed knife adjustment even over the width of the machine.
- ✚ To avoid cutting the shim stock, turn the rotor backward during the adjustment procedure.
- ✚ Use the rotor knife with the largest dimension from rotor centerline as the reference, i.e., the highest knife.

#### **MEASURE THE KNIFE GAP**

- ✚ Use brass shim stock to set the knife gap to the cutting clearance of 0.006 in. to 0.008 in. (0.15 mm to 0.20 mm).
- ✚ Remove the rotor-locating pin.
- ✚ Rotate the rotor backward, by hand, and measure the gap between it and the bed knife at the point of shear. You can work on each half of the bed knife independent of the other half but keep them in step with each other by working from side-to-side.



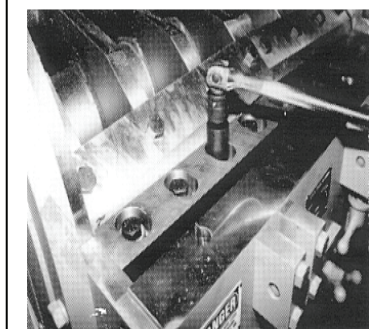
## **SETTINGS AND ADJUSTMENTS**

### **SECTION 4-15**

#### *Adjusting or Replacing Rotor Knives*

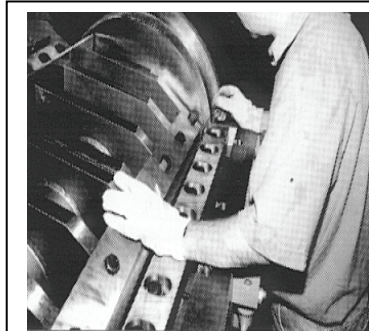
#### **SET THE DOWNSTROKE KNIFE SHIELD**

- ✚ Position the knife shield so that it sets back from the bed knife edge about 1/32 in. for film and 1/16 in. for thicker materials. Use a plastic or leather mallet, if necessary, to tap the shield or knife-
- ✚ The upstroke knife clamp does not need this adjustment.
- ✚ Carefully adjust the bed knife clearance to its final setting and snug down the mounting screws with a 30 mm socket wrench.



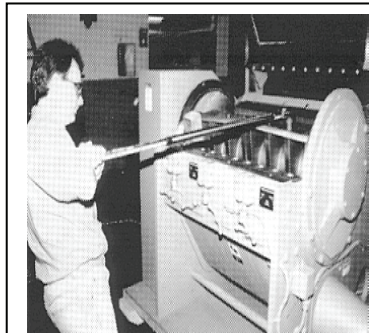
#### **CHECK THE KNIFE GAP**

- ✚ Snug the screws down in stages keeping them about even as you progressively tighten them. Recheck the knife gap after snugging down the mounting screws.
- ✚ After setting up to one rotor knife (usually the highest knife), rotate the remaining knives slowly by the bed knife and quickly verify the knife gap.



#### **TIGHTEN THE SCREWS TO FINAL TORQUE**

- ✚ When the knife gap is adjusted to the proper dimension, tighten the mounting screws to a torque of 472 ft lbs (640 Nm). For safety, make sure that you have solid footing when you apply this final torque.
- ✚ Recheck the gap after tightening the screws to the final torque.
- ✚ Make sure that both halves of the bed knife are adjusted.





**SEE SECTION 6-11 PAGE 88 FOR CUTTING CHAMBER CLOSING INSTRUCTIONS.**

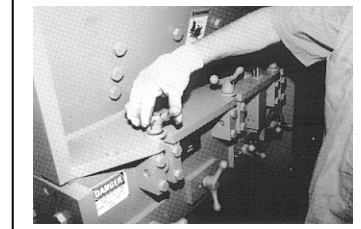
## SETTINGS AND ADJUSTMENTS

### SECTION 4-16



#### *Adjusting or Replacing Rotor Knives*

#### **FASTEN THE CUTTING CHAMBER**

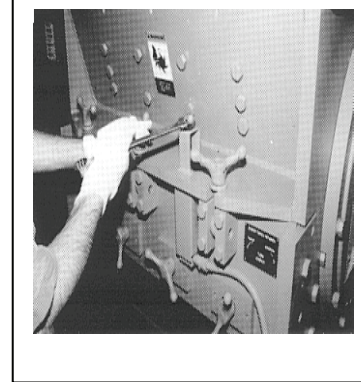
-  Raise the hold-down clamps to their upright positions.
-  Turn the knobs clockwise until they are tight against the chamber housing.



#### **CLOSE THE CUTTING CHAMBER SAFETY INTERLOCK**

-  Engage the safety interlock by turning the actuator screw clockwise with a box wrench or a ratchet wrench.
-  Make sure the screw is fully seated against the top surface of its housing.

When engaged, the interlock closes the electrical control circuit to the motor and allows the machine to run.



#### **RESTART THE GRANULATOR**

If necessary to replace the fuses, call an electrician to do it.

UNLOCK AND TURN ON the main power.

Remove the OUT OF SERVICE tag.

Start the granulator by depressing the start pushbutton on the electrical cabinet.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-17






#### *Drive Belt Replacement Or Adjustment*

#### **OVERVIEW**



Belt tension is important to the proper operation of the drive system of your granulator. Improper belt tension can lead to excessive belt wear and/or undue bearing wear on the rotor and motor bearings.

This procedure shows you how to access the drive belts and how to adjust the tension to recommended levels. It also shows you how to replace the belts.



-  **TURN OFF AND LOCKOUT** the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).
-  If it is not possible to lock out the power, have an electrician remove the fuses.
-  Make sure the rotor has come to a complete stop.
-  The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.
-  Wear gloves to protect against injury from the rotor or bed knives.

#### **REMOVE THE DRIVE GUARD COVER**

-  Use a socket wrench to remove the fasteners that retain the drive guard cover.
-  Remove the cover.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-18

#### *Drive Belt Replacement Or Adjustment*

#### **INSPECT THE DRIVE BELTS**

- ✚ Check the belts for cracks in the V-sections that ride in the pulley grooves as well as on the outside surface of the belts. Also look for signs of excessive wear.
- ✚ If replacement is necessary, continue with the steps that follow.
- ✚ If it is not necessary to replace the belts, skip ahead to the step entitled Measure the Belt Span.

#### **REMOVE THE BELTS**

- ✚ Loosen the motor mount locking screws.
- ✚ Loosen the belt tension on the V-belts by turning the adjusting screws on the motor base counterclockwise-
- ✚ When the tension has been released sufficiently, slip the belts over the pulley and remove them.
- ✚ If replacement of any V-belt is necessary, all belts must be replaced at the same time with a set of matched belts.



#### **INSTALL THE MATCHED BELTS**

- ✚ Check the parts list to verify the part number of the correct belts.
- ✚ Slip the belts into the grooves, one-at-a-time, making sure that the motor base has been adjusted enough to allow the belts to be installed without danger of overstressing them by forcing them over the edges of the V-grooves.



#### **TIGHTEN THE BELT TENSION**

Turn the adjusting screw on the adjustable motor base clockwise to increase the distance of the motor shaft from the rotor sheave. When the belts become snug, but not tight, stop the adjustment and use the procedure that follows to set the belt tension.



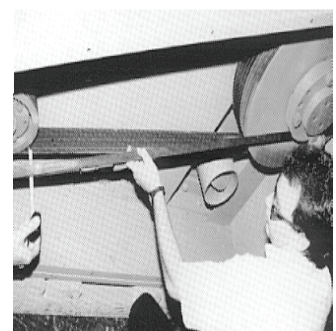
## SETTINGS AND ADJUSTMENTS

### SECTION 4-19

#### *Drive Belt Replacement Or Adjustment*

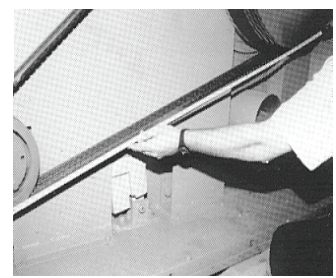
#### **CHECK THE PULLEY ALIGNMENT**

- ✚ Tug outward on the pulleys to verify that they are tight on their shafts.
- ✚ Check the pulley alignment by holding a straight edge against the edge of the large pulley and verifying that it is aligned with the edge of the small pulley. If the edges of the pulleys do not align, perhaps because the small pulley doesn't have as many grooves, use a tape to measure from the straight edge to the belt on each pulley.



#### **MEASURE THE BELT SPAN**

Measure the belt span between the contact points on the large and small pulleys as shown.



#### **CALCULATE THE ALLOWABLE BELT DEFLECTION**

The allowable belt deflection is obtained as follows.

Allowable belt deflection = Belt Span in inches (or mm) divided by 64

Another way to show that relationship: allowable belt deflection =  $\frac{\text{Belt Span (in inches or mm)}}{64}$

#### **MEASURE THE DEFLECTION FORCE**

- ✚ A gage to measure belt tension greatly facilitates this measurement. You may purchase one from Cumberland Engineering, or from the belt manufacturer.

NOTE: Check the instructions supplied with the belt tension gage for proper setting of the scales.

- ✚ Use the belt gage to measure the force required to deflect the belt to the allowable dimension



# SETTINGS AND ADJUSTMENTS

## SECTION 4-20

### Drive Belt Replacement Or Adjustment

#### COMPARE MEASURED FORCE TO RECOMMENDED FORCE

- ✚ Compare the deflection force measured, to the value shown in the table.
- ✚ For new belts the value for run-in should be used.
- ✚ For belts, which have been running two days or more, use the values for normal running.

Inch dimensions			
Belt Cross Section	Small O.D. Range	Deflection force Lbs/V-Belt	
		Run-in	Normal
5V	7.1 - 10.9	22	15
8V	12.5 - 17.0	50	33
Metric dimensions			
5V	180-275	10 Kg	6.8 Kg
8V	318-432	22.7 Kg	15 Kg

#### ADJUST THE BELT TENSION

Adjust the sliding motor base to increase the belt tension by turning the adjusting screws clockwise.

When the tension has been increased significantly, recheck it using the procedure just described.

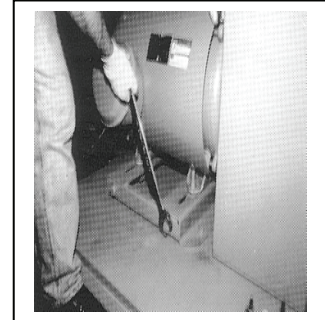
Repeat the process of adjustment and tension checks until the allowable deflection is achieved while the deflection force is within the range shown in the table.

Tension new drives at the maximum deflection force recommended.

Check the tension at least two times during the first two days of operation. There is normally a rapid decrease in tension until the belts are run in.

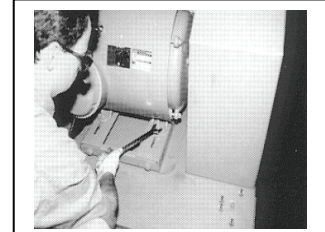
Check the tension periodically after the first day of operation and keep the tension in the recommended range.

The correct operating tension for a V-belt drive is the lowest tension that allows NO belt slip under peak load conditions. If the deflection is more than the specified deflection at the recommended force, tighten the belts. If the deflection is less than the specified deflection at the recommended force, loosen the belts.



#### TIGHTEN THE MOTOR BASE BOLTS

Tighten down the motor mounting bolts.



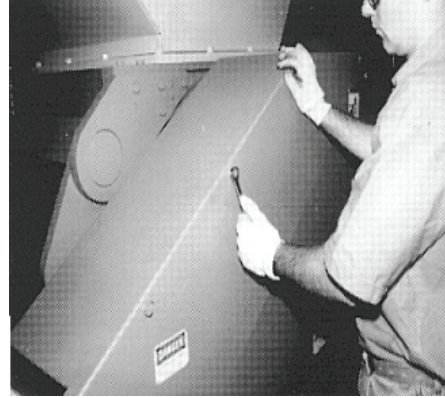
## SETTINGS AND ADJUSTMENTS

### SECTION 4-21

#### *Drive Belt Replacement Or Adjustment*

#### **REPLACE THE DRIVE GUARD COVER**

- ✚ Replace the guard cover.
- ✚ Use a socket wrench to replace the fasteners.



#### **RESTART THE GRANULATOR**

- ✚ If necessary to replace the fuses, call an electrician to do it.
- ✚ UNLOCK AND TURN ON the main power.
- ✚ Remove the OUT OF SERVICE tag.
- ✚ Start the granulator by depressing the start pushbutton on the electrical cabinet.



## **SETTINGS AND ADJUSTMENTS**

### **SECTION 4-22**

#### *Setting and Adjusting the Chamber Jackscrew*

#### **OVERVIEW**

Proper adjustment of the two machine-mounted jackscrews is important to performance and safety. Improper settings can result in premature failure of the jackscrews.

To avoid severe damage to the jackscrews, **BE PREPARED TO SHUT THEM DOWN IMMEDIATELY WHEN THE CHAMBER IS MOTIONLESS FOR ANY REASON WHILE THE MOTORS ARE RUNNING.** This condition can occur when the chamber jams on debris or when the chamber reaches the end of its stroke, whether on the opened or closed end of the stroke (if the limit switches are not properly adjusted).

This procedure describes how to check and make adjustments to the cutting chamber jackscrew limit switches and the mounting bracket limit switch.

#### **WORK SAFELY**



**TURN OFF AND LOCKOUT** the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag-out of Energy Sources).

If it is not possible to lock out the power, have an electrician remove the fuses.

Make sure the rotor has come to a complete stop.

The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jackscrews **DO** operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

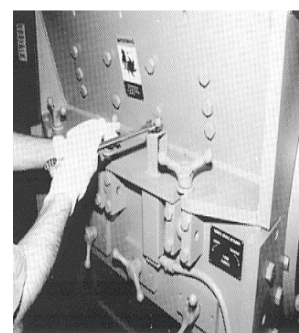
Wear gloves to protect against injury from the rotor or bed knives.

#### **OPEN THE CUTTING CHAMBER INTERLOCK**

Disengage the interlock actuator screw with a box wrench or a ratchet wrench.

Make sure the end of the interlock actuator screw is visible and clear of any contact.

When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.





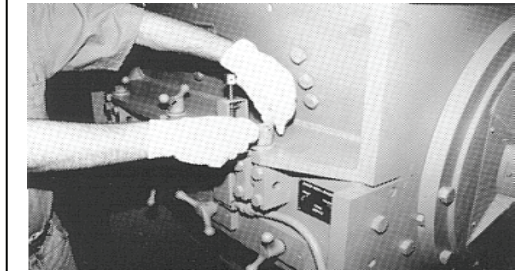
## SETTINGS AND ADJUSTMENTS

### SECTION 4-23

#### *Setting and Adjusting the Chamber Jackscrew*

#### **RELEASE THE CUTTING CHAMBER FASTENERS**

-  Turn the hold-down clamps counterclockwise to loosen them.
-  Swing the hold-down clamps toward you until they are disengaged from the cutting chamber housing



#### JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

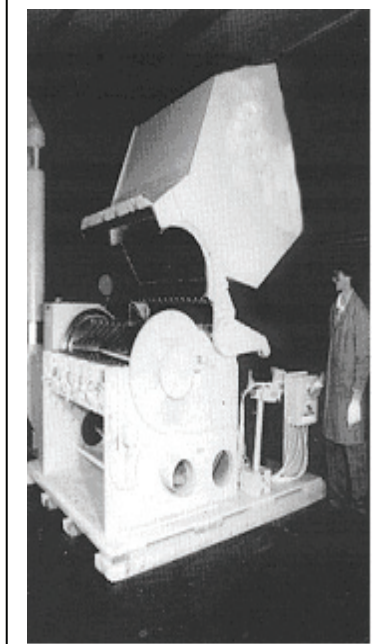
#### **CUTTING CHAMBER OPEN SETPOINT**

At its full-open position, the cutting chamber should be open just far enough that the center of gravity of the chamber is toward the rear of the machine.

As the cutting chamber approaches its set point, the upper pivot arm moves quickly through a short distance as the hopper weight shifts to the rear. The jackscrew motor should stop just after this movement occurs.

**DO NOT ALLOW THE JACKSCREW MOTOR TO RUN BEYOND THE POINT WHERE THE CHAMBER MOTION STOPS: THIS COULD RESULT IN SEVERE DAMAGE TO THE JACKSCREW.**

If the cutting chamber does not reach the set point or if the motor does not stop at the point described, the jackscrew limit switches must be adjusted. Confirm whether the cutting chamber operates properly as you open it in the next step.



## SETTINGS AND ADJUSTMENTS



### SECTION 4-24

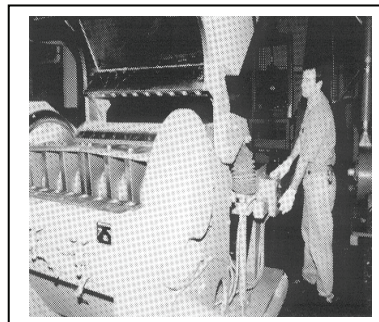
#### *Setting and Adjusting the Chamber Jackscrew*

OPEN THE CUTTING CHAMBER









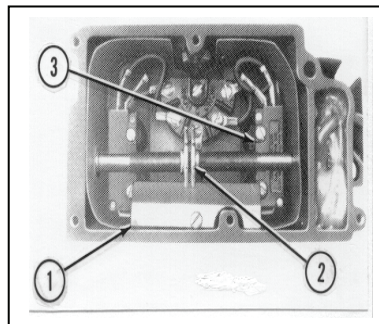
The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jack- screws DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

-  Make sure no one is near the jackscrew or hopper during operation.
-  Actuate the cutting chamber jackscrew from the jackscrew console by turning the CC/Hopper (Cutting Chamber/ Hopper) switch to the RAISE position. Hold the switch till the hopper stops or until it passes the set point described previously in the topic entitled Cutting Chamber Open Set point. If necessary, reset the jackscrew open limit switch as described in the next step.



### **ADJUST THE JACKSCREW OPEN-POSITION LIMIT SWITCH**

-  Jog the chamber open till it arrives at the set point.
-  Open the chamber jackscrew switch housing and remove the keeper (1).
-  Turn the OPEN-POSITION NUT (2) toward the switch (3) until the switch trips. Turn the nut an additional half-turn toward the switch.
-  Replace the keeper.
-  Run the jackscrew to check the open-position stop.
-  If the stop is okay, proceed with the steps that follow.



JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

## **SETTINGS AND ADJUSTMENTS**

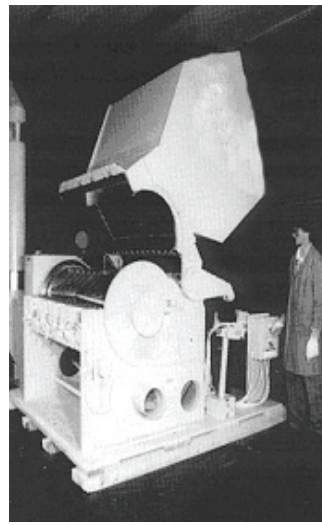
### **SECTION 4-25**

#### *Setting and Adjusting the Chamber Jackscrew*

CLOSE THE CUTTING CHAMBER



- ✚ Make sure that no one is near the jackscrew or hopper.
- ✚ Clear the mating surfaces of the cutting chamber of any debris that might prevent tight closure.
- ✚ At the jackscrew console, turn the CC/Hopper (Cutting Chamber/Hopper) switch to the LOWER position. Hold the switch till the hopper stops.
- ✚ When the jackscrew motor stops, the cutting chamber should be closed and snug against the lower half of the



#### **IF THE MOTOR STOPS BEFORE THE CUTTING CHAMBER CLOSES**

- ✚ Check the mating surfaces between the upper chamber and the lower chamber for debris that may prevent the chamber from closing. If the mating surfaces are clean, proceed to the next step.
- ✚ Check the jackscrew internal limit switch setting and adjust it as necessary. Refer to the topic entitled “Set the Jackscrew Closed-Position Switch” which follows.

#### **SET THE JACKSCREW CLOSED-POSITION LIMIT SWITCH**

- ✚ Remove the switch cover.
- ✚ Jog the cutting chamber slowly downward until it contacts the mating surface of the lower chamber.
- ✚ Remove the keeper (I) shown in the illustration that follows.

(Continued on next page)

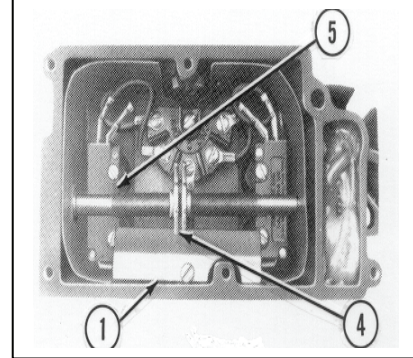
## SETTINGS AND ADJUSTMENTS

### SECTION 4-26

#### *Setting and Adjusting the Chamber Jackscrew*

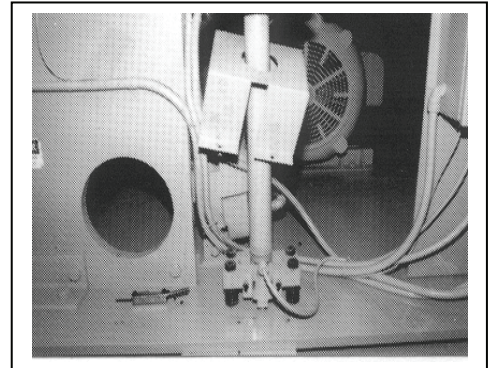
#### **SET THE JACKSCREW CLOSED-POSITION LIMIT SWITCH** (Continued from previous page)

- ✚ Rotate the CLOSED POSITION NUT (4) until the switch (5) trips. Then turn it an additional half turn toward the switch.
- ✚ Replace the keeper (1).
- ✚ Test the closed position and be prepared to release the selector switch at the jackscrew console if the stop fails.
- ✚ If the operation is satisfactory, replace the housing cover.



#### **THE CHAMBER STOPS BEFORE IT CLOSES BUT THE MOTOR CONTINUES TO RUN**

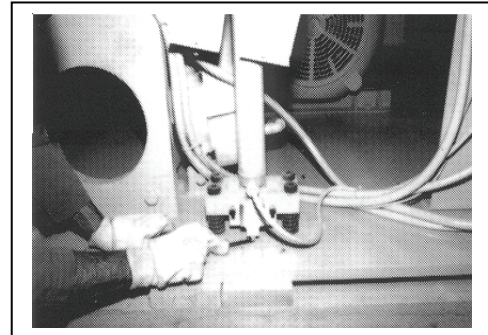
- ✚ IMMEDIATELY SHUT DOWN THE JACKSCREW MOTOR. DO NOT ALLOW THE JACK- SCREW MOTOR TO RUN BEYOND THE POINT WHERE THE CHAMBER MOTION STOPS: THIS COULD RESULT IN SEVERE DAMAGE TO THE JACKSCREW.
- ✚ Check the mating surfaces of the cutting chamber (between the upper and lower chamber) to ensure that it is clear of debris that may prevent it from closing.
- ✚ The mounting bracket limit switch should have tripped. When this switch trips the electrical current to the jackscrew motor is interrupted, stopping the motor. If the switch does not trip, it needs to be adjusted. If the switch has tripped, but the motor continues to run, then the switch may be defective and/ or the remaining electrical circuit will need checking by an electrician.



#### **SET & TEST THE MOUNTING BRACKET LIMIT SWITCH**

- ✚ Remove the sheet metal cover
- ✚ Loosen the two screws on the limit switch mounting plate.
- ✚ With the chamber open, adjust the plate so that the limit switch plunger is within 1/8 in. (3 mm) of the machine base plate.

(Continued on next page)



## SETTINGS AND ADJUSTMENTS

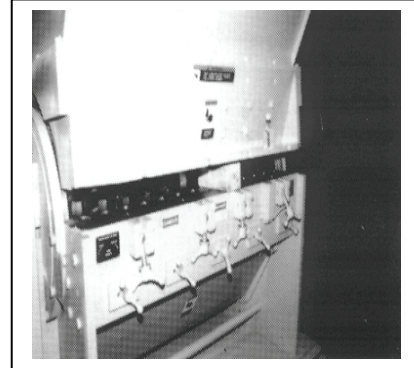
### SECTION 4-27

#### *Setting and Adjusting the Chamber Jackscrew*

#### **SET & TEST THE MOUNTING BRACKET LIMIT SWITCH**

(Continued from previous page)

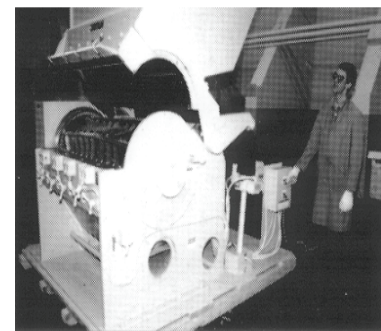
- ✚ Place a 4 in. x4 in.x12 in. (100 mm x 100 mm x 300 mm) wood block on its 4 in. (100 mm) side between the mating surfaces of the cutting chamber, as shown.
- ✚ Carefully close the chamber until it bears on the wood block (4" from the closed position) with some pressure and check that the limit switch shuts off the jackscrew motor. Be prepared to stop the jackscrew at the console switch in the event that the mounting bracket switch is not properly set or is not functioning correctly.
- ✚ Open the cutting chamber and close it on the wood block again to verify the switch operation. If the switch is properly set, the jackscrew motor shuts down immediately.
- ✚ If the operation is satisfactory, replace the sheet



#### **CLOSE THE CUTTING CHAMBER**

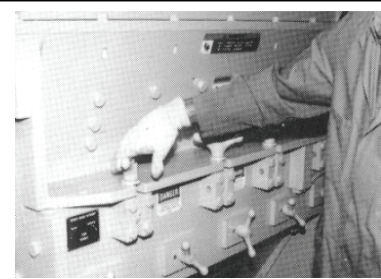


- Make sure that no one is near the jackscrew or hopper.
- ✚ Clear the mating surfaces of the cutting chamber of any debris that might prevent tight closure.
  - ✚ At the jackscrew console, turn the CC/Hopper (Cutting Chamber/Hopper) switch to the LOWER position. Hold the switch till the hopper stops.



#### **FASTEN THE CUTTING CHAMBER**

- ✚ Raise the hold-down clamps to their upright positions.
- ✚ Turn the knobs clockwise until they are tight against the chamber housing.



## SETTINGS AND ADJUSTMENTS

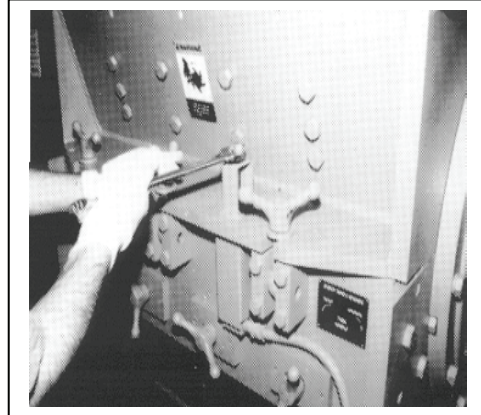
### SECTION 4-28

#### *Setting and Adjusting the Chamber Jackscrew*

#### **CLOSE THE CUTTING CHAMBER SAFETY INTERLOCK**

- ✚ Engage the safety interlock by turning the actuator screw clockwise with a box wrench or a ratchet wrench.
- ✚ Make sure the screw is fully seated against the top surface of its housing.

When engaged, the interlock closes the electrical control circuit to the motor and allows the machine to run.



## SETTINGS AND ADJUSTMENTS

### SECTION 4-29

#### *Setting and Adjusting the Cradle Jackscrew*

#### **OVERVIEW**

Proper adjustment of the two machine-mounted jackscrews is important to performance and safety. Improper settings can result in premature failure of the jackscrews.

To avoid severe damage to the screen cradle jackscrew, **BE PREPARED TO SHUT IT DOWN IMMEDIATELY WHEN THE CRADLE IS MOTIONLESS FOR ANY REASON WHILE THE MOTOR IS RUNNING.** This condition can occur when the screen cradle jams on debris or when the cradle reaches the end of its stroke, whether on the opened or closed end of the stroke (if the limit switches are not properly adjusted).



This procedure describes how to check and make adjustments to the screen cradle jackscrew limit switches.

#### JACKSCREW OPERATION



When you **REVERSE** the jackscrew operating direction, always **ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP.** Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the **JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.**



#### **OPEN THE SCREEN CRADLE INTERLOCK**

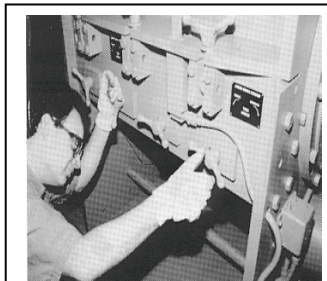
-  Disengage the interlock actuator screw with a box wrench or ratchet wrench.
-  Make sure the end of the actuator screw is visible and clear of any contact.

When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.



#### **RETRACT THE SCREEN CRADLE RETAINERS**

-  Turn the screen cradle retainer knobs clockwise until they stop. (This retracts the support wedges from beneath the screen cradle.)
-  When the wedges are fully retracted, rods extend so that their ends are flush with the surface of each of the retaining knob mounting plates.





## SETTINGS AND ADJUSTMENTS

### SECTION 4-30

#### *Setting and Adjusting the Cradle Jackscrew*

#### JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

#### CRADLE OPEN POSITION

When fully open, the rear of the screen cradle should just make contact with the cutting chamber support rod. If the jackscrew opens too far and the motor continues to run, IMMEDIATELY STOP THE JACKSCREW MOTOR TO AVOID SERIOUS DAMAGE TO THE JACKSCREW then adjust the cradle jackscrew open- position limit switch.

Alternately, if the cradle stops before it reaches the open position, the screen cradle jackscrew open-position limit switch must be adjusted.

#### BEWARE OF ROTOR KNIVES



Avoid contact with the rotor knives, which are just above the screen. The cutting edges are very sharp

Wear gloves to avoid injury when working in this area.

#### LOWER THE SCREEN CRADLE



The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Make sure no one is near the jackscrew or the cradle during operation.

(Continued on next page)

## SETTINGS AND ADJUSTMENTS

### SECTION 4-31

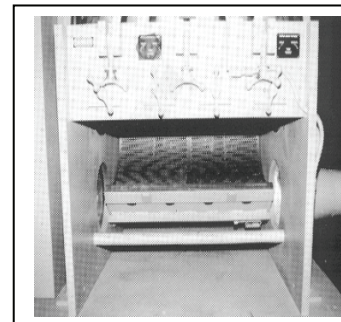
#### *Setting and Adjusting the Cradle Jackscrew*

LOWER THE SCREEN CRADLE



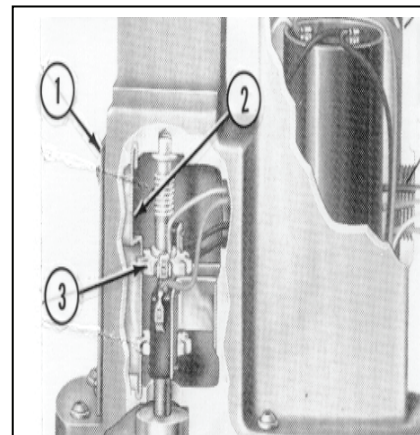
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- ✚ Actuate the screen cradle jackscrews by turning the selector switch to LOWER at the jackscrew console.
- ✚ Hold the switch in position until the cradle approaches the open stop location described previously. **TO AVOID SERIOUS DAMAGE TO THE JACKSCREW, STOP THE JACKSCREW MOTOR AS SOON AS YOU OBSERVE THAT THE MOTOR DOES NOT STOP AT THE PROPER LOCATION.** If necessary, adjust the cradle open-position limit switch as described in the topic entitled “Adjust the Cradle Open-Position Limit Switch”, which follows.



### **ADJUST THE CRADLE OPEN-POSITION LIMIT SWITCH**

- ✚ Jog the cradle open till it arrives at the set point.
- ✚ Open the screen cradle jackscrew switch housing (1) and remove the keeper (2).
- ✚ Turn the OPEN-POSITION NUT (3) toward the switch until the switch trips. Turn the nut an additional half turn toward the switch.
- ✚ Replace the keeper.
- ✚ Run the jackscrew to check the up-position stop.
- ✚ If the stop is okay, proceed with the steps that follow.



JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

## SETTINGS AND ADJUSTMENTS

### SECTION 4-32

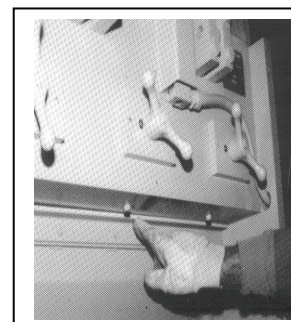
#### *Setting and Adjusting the Cradle Jackscrew*

#### **CHECK THE CRADLE CLOSED-POSITION SWITCH**

When the screen cradle is fully closed, the cradle front flange should be parallel with the down stroke knife block and the cradle wedges should engage the cradle freely. If this does not occur, or if the jackscrew motor continues to run when the cradle is fully closed, the jackscrew internal limit switches must be adjusted.

If the jackscrew motor continues to run beyond the closed position, STOP THE JACKSCREW MOTOR IMMEDIATELY TO AVOID SERIOUS DAMAGE TO THE CRADLE JACKSCREW. Adjust the jackscrew closed-position limit switch.

If the cradle stops before it reaches the closed position, the jack- screw closed-position limit switch must be adjusted as described in the topic entitled Adjust the Jackscrew Closed-Position Limit Switch, which follows.





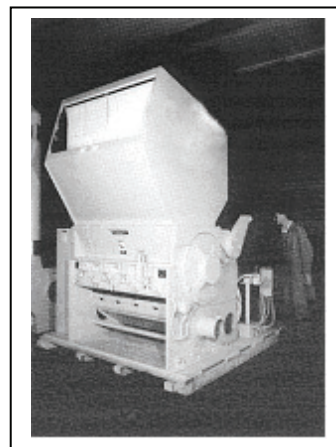
RAISE THE SCREEN CRADLE



The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Make sure that no one is near the jackscrew or screen cradle during operation.

-  Actuate the screen cradle jackscrews by turning the selector switch to RAISE at the jackscrew console.
-  Hold the switch in position until the cradle approaches the closed position described previously. TO AVOID SERIOUS DAMAGE TO THE JACKSCREW, STOP THE JACKSCREW MOTOR AS SOON AS YOU OBSERVE THAT THE MOTOR DOES NOT STOP AT THE PROPER LOCATION. If necessary, adjust the cradle-closed-position limit switch as described in the topic entitled Adjust the Cradle Closed-Position Limit Switch that follows.



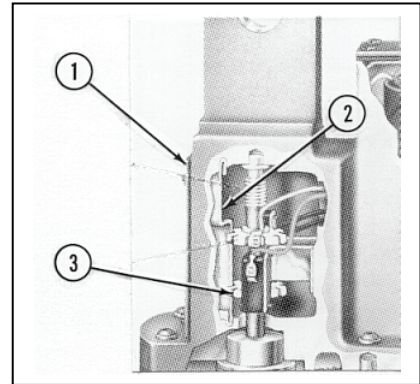
## SETTINGS AND ADJUSTMENTS

### SECTION 4-33

#### *Setting and Adjusting the Cradle Jackscrew*

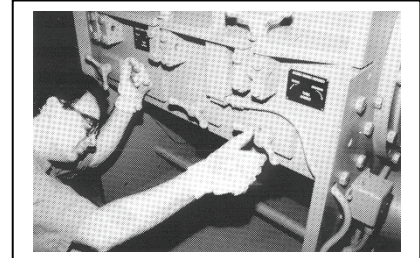
#### **ADJUST THE CRADLE CLOSED-POSITION LIMIT SWITCH**

- Jog the cradle to close until it arrives at the stop position.
- ✚ Open the cradle jackscrew switch housing cover (1) and remove the keeper (2).
  - ✚ Turn the CLOSED-POSITION NUT on the bottom (3) toward the switch until the switch trips. Turn the nut an additional half-turn toward the switch.
  - ✚ Replace the keeper.
  - ✚ Run the jackscrew to check the closed-position stop.
  - ✚ If the stop is okay, proceed with the steps that follow.



#### **CLOSE THE SCREEN CRADLE RETAINERS**

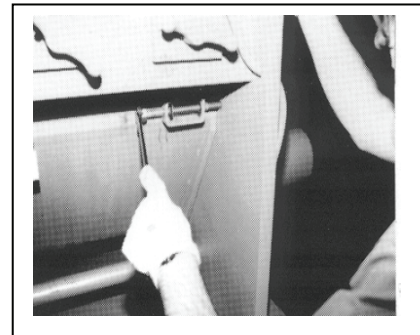
- ✚ Turn the screen cradle retainer knobs counterclockwise until they stop. (This returns the retainer wedges to their positions under the screen cradle where they lock the cradle in place.)



#### **CLOSE THE SCREEN CRADLE INTERLOCK**

- ✚ Engage the interlock screw by turning it clockwise with a box wrench or a ratchet wrench.
- ✚ Make sure the interlock actuator screw is fully seated against the top surface of its housing.

When engaged, the interlock switch closes the electrical control circuit to the machine and allows it to operate.

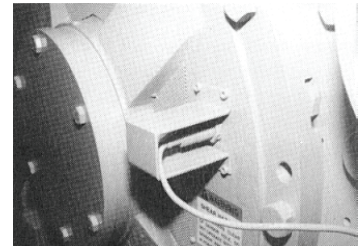


## SETTINGS AND ADJUSTMENTS

### SECTION 4-34 *Zero Speed Sensor*

#### **ZERO SPEED SENSOR**

The zero speed sensor detects the motion of the rotor assembly. The sensor is interlocked to the control circuits of the two machine jackscrews. If the rotor is turning, then the jackscrews should not operate. If you notice that the jackscrews are operational while the rotor is turning, check the following areas.

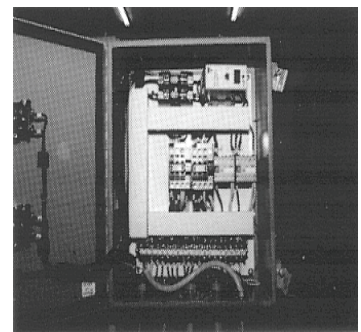


#### **ZERO SPEED SENSOR OPERATION**




There is a red pilot light on the sensor amplifier located in the control console. When the rotor is in motion, the red pilot light is lit. If the rotor is stopped, the pilot light is out.

The sensor has a green pilot light which, when it is lit, indicates that the power to the sensor is on.




If the rotor is in motion and the red light is off while the green light is on, check the sensor position.



#### **ADJUST THE SENSOR POSITION**

-  Disconnect and remove the sensor wire from the control console. Refer to the wiring diagram supplied with your manual for details.
-  Remove the sensor from the bearing housing. Measure the length of the thread in the tapped hole on the bearing housing where the sensor was mounted. Using this dimension, measure from the end of the sensor and set the locknut at this point.
-  Thread the sensor into the hole and lock it in position. Turn the rotor assembly slowly by hand to be sure that there is no interference between the sensor and the rotating members. Complete the wiring between the sensor and the control console.

#### **CONTROL CIRCUIT**




-  If the green pilot light is off at all times or if re-positioning the sensor does not correct the sensor operation, then check the control circuit.
-  Check the control circuit logic between the hydraulic system or jackscrews, the safety switches, the zero speed amplifier, and the zero speed sensor.
-  Refer to the wiring diagram supplied with your manual for details.

## **SETTINGS AND ADJUSTMENTS**


### **SECTION 4-35**

#### *Adjustable rotor knives*




#### **ROTOR KNIFE PREPARATION**

-  Prepare the rotor knives for setting by installing the adjusting screws and lock nuts into the rear of the knife.
-  Be sure that the screws are fully engaged into the knife. This will assure easy installation into the knife setting fixture.
-  Use only factory supplied adjusting screws. These screws are accurately machined in order to assure proper knife settings.

#### **ROTOR KNIFE INSTALLATION INTO FIXTURE**

-  Loosen the front fixture screw and install the knife into fixture.  
With the knife installed tighten the front fixture screw.

#### **KNIFE LENGTH SETTING**




-  Turn out the adjusting screws until the heads make firm contact with rear setting blocks.
-  With the screws properly adjusted the front edge of the knife should be in contact with the front setting block, along it's entire length.
-  Tighten the locknuts against the rear of the knife to maintain the setting.

## **SETTINGS AND ADJUSTMENTS**





### **SECTION 4-35**

#### *Adjustable rotor knives*

#### **KNIFE LENGTH SETTING-INSPECTION**

-  Check with a .0015 feeler gauge to ensure that cutting edge of the knife is snug against the front setting block. This should be consistent along the entire block length.
-  If the fit is proper then the knife is at it's proper operational length.
-  Loosen the front setting block screw and remove the knife.

#### **ADJUSTABLE ROTOR KNIFE INSTALLATION**

-  Set the knife on the rotor knife seat. The head of the rear adjusting screws should contact the rotor mounted locaters.
-  Check with a .0015 feeler gauge to ensure that the adjusting screws are snug against the locaters.
-  The rotor mounted locaters are specifically sized to provide the proper knife setting location. If replacement is required use only factory supplied locaters.
-  To finalize the rotor knife installation, see the rotor knife installation instructions stated previously in this manual

## **SETTINGS AND ADJUSTMENTS**

### **SECTION 4-36**

#### *Settings and Adjustments Hydraulic opening*

##### **HYDRAULIC OPENING POSITION SWITCHES**

Both the Upper Chamber/Hopper and the Screen Cradle have switches to assure proper closing positions. These switch locations are set at the factory and should not require adjustment. When operating properly, the hydraulic pump will shutoff as the Upper Chamber/Hopper or the Screen Cradle reach their full closed position.

If in these modes of operation the pump motor continues to run, the unit should be shutdown and maintenance called to troubleshoot the operation.

Several factors could cause this situation. Positioning of switches, function of the switches or other mechanical/electrical issues. The limit switches are mounted on adjustable plates. Adjust the plate so that the switch is activated just as either the Upper Chamber/Hopper Screen Cradle reaches their full closed positions (see Part Identification Drawing 348070). An electrician should perform all testing.

See drawing nos. 348070, 348185 and 1554-460 in rear of this manual.

##### **HYDRAULIC PUMP OPERATION**

The setting on the hydraulic pump assembly is set at the factory for the specific application that they were originally intended. No changes should be made to the setting without consulting the factory.



## OPERATION

### SECTION 5-1 *Initial Startup*

#### SAFETY CHECK







Before operating the granulator, make sure that all of the electrical, mechanical, and lubrication requirements have been completed in accordance with the installation instructions in Section 3. Proper adjustments and settings are made prior to shipment, however the machine may require readjustment. For knife gap settings refer to Section 4, Settings and Adjustments.





If the machine is being started for the first time or if it has been moved to a new location, perform the following check to ensure a safe startup.

#### WORK SAFELY



-  TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag out of Energy Sources).
-  If it is not possible to lock out the power, have an electrician remove the fuses.
-  Make sure the rotor has come to a complete stop.
-  The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

#### **CHECK FOR MECHANICAL INTERFERENCES**

-  Remove the drive guard cover by removing the fasteners with a socket wrench, then, remove the cover.
-  Turn the rotor sheave until the rotor knives have made one full revolution.
-  If there are interferences, correct them before proceeding to the next step.
-  Replace the drive guard.

## OPERATION

### SECTION 5-2 to 5-3 *Initial Startup*

#### **CHECK THE MOTOR ROTATION DIRECTION**

- ✚ Unlock the power.
- ✚ Push the start-stop pushbutton in quick succession to start the machine, then, let it coast without power.
- ✚ While the machine is coasting to a stop, check the V-belt direction by looking through the slots in the drive guard. The top of the V-belt should move toward the front of the machine as indicated by the arrow plate on top of the guard cover.
- ✚ If the motor rotation is not in the proper direction, TURN OFF and LOCK OUT the power per OSHA 1910.147 or ANSI Z244.1, 1982 (Lockout/Tag out of Energy Sources).
- ✚ Call a qualified electrician to correct the problem. Refer to Section 3 for procedure.

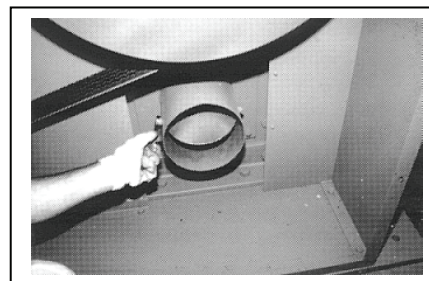
#### **RUN THE MOTOR**

- ✚ If the motor is turning in the proper direction, restart the machine with the start pushbutton on the electrical cabinet and allow the motor to run up to speed for 30 seconds.
- ✚ The granulator is now ready for operation.

#### **DISCHARGE AIR ADJUSTMENT**

If the discharge airflow is insufficient, the granulate can accumulate in the discharge transition just below the screen cradle. The buildup eventually backs up into the cutting chamber where continued agitation by the rotor can cause overheating and possibly stalling of the motor.

The discharge damper may be located on either side of the machine. On this machine it is located under the rotor sheave inside the drive compartment; it controls the amount of air that flows through the discharge transition and the discharge blower. Adjust it as shown to obtain the required discharge conveying velocity, while maintaining maximum airflow through the cutting chamber.



## OPERATION

### SECTION 5-4 Normal Operation




FEED THE MACHINE



Never reach beyond the hopper curtain while the machine is running.

To clear a jam, refer to the procedure for clearing a jammed cutting chamber, which follows in this section. Avoid excessive feed rates. Feed the machine by placing the plastic pieces into the hopper at a rate approximating the rated capacity of the granulator. Feed rates in excess of rated capacity will cause the machine to stall or jam.

### **SHUT DOWN THE MACHINE**

-  To shut down, stop feeding the material into the hopper, and allow the machine to run long enough to clear all material from the cutting chamber and discharge chute.
-  Press the stop pushbutton on the electrical cabinet. This shuts off the drive motor.
-  Turn off the power at the electrical cabinet.

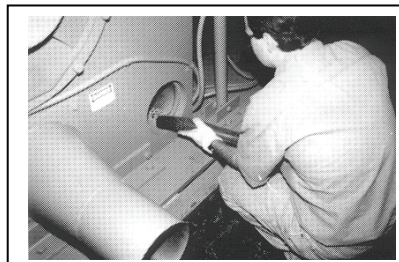
DISCHARGE CLEANOUT SAFETY



Do NOT reach into the discharge cleanout opening with any part of your body. Movement of the screen cradle at such a time could result in serious injury.

### **CLEANING THE DISCHARGE TRANSITION**

When the screen cradle is opened, any material remaining in the discharge transition may be removed via the cleanout opening. Material removal should be done with a shop vacuum as shown.








## OPERATION

### SECTION 5-5 *Safely Clearing a Jam*

#### WORK SAFELY





-  TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag out of Energy Sources).
-  If it is not possible to lock out the power, have an electrician remove the fuses.
-  Make sure the rotor has come to a complete stop.
-  The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.
-  Wear gloves to protect against injury from the rotor or bed knives.

#### JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

#### **OPEN THE CUTTING CHAMBER**

-  Open the screen cradle per instructions in Section 6-6 entitled Screen Replacement.
-  Open the cutting chamber per instructions in Section 6-9 entitled Cutting Chamber Access.

NEVER ATTEMPT TO FREE A JAMMED MACHINE BY PLACING YOUR HANDS ON THE ROTOR, ON THE KNIVES, OR INSIDE THE CUTTING CHAMBER.

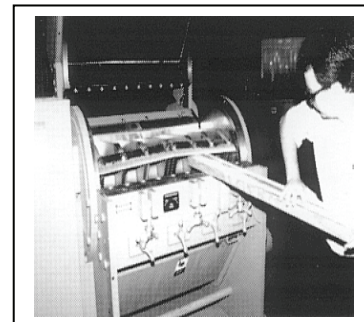
KEEP YOUR HANDS CLEAR OF THE ROTATIONAL PATH OF THE ROTOR KNIVES.

## MAINTENANCE

### SECTION 5-6 *Periodic Maintenance*

#### **CLEAR THE JAM**

- ✚ A leather mallet and block of wood of sufficient length to keep hands away from the path of the knives can be used if required.
- ✚ Use the block of wood to exert force on the rotor, usually in the direction opposite normal rotation.
- ✚ Make sure you have secure footing on a clean floor and keep your body well braced while prying on the rotor. Guard against loss of balance should the jammed condition suddenly come free.
- ✚ Use pliers to remove material from the cutting chamber, keep in mind that the removal of material may cause rotation of the rotor and rotor knives.
- ✚ If prying on the rotor is unsuccessful, remove the bed knife and rotor knife at the jam. For information about bed knives, refer to Section 4, Settings and Adjustments.
- ✚ Close the screen cradle per instructions in Section 6-4 entitled Screen Replacement.
- ✚ Close the cutting chamber per instructions in Section 6-9 entitled Cutting Chamber Access.



#### **MALFUNCTION CHECK**



A malfunction of the machine, such as a jam, may cause undue strain or damage to any part. Do not restart the machine after such a malfunction without checking to see whether damage was done or whether settings were changed by the malfunction.

#### **RESTART THE GRANULATOR**

- ✚ If necessary to replace the fuses, call an electrician to do it.
- ✚ UNLOCK AND TURN ON the main power.
- ✚ Remove the OUT OF SERVICE tag.
- ✚ Start the granulator by depressing the start pushbutton on the electrical cabinet.

## MAINTENANCE

### SECTION 6-1 *Periodic Maintenance*

**TABLE 1: PERIODIC MAINTENANCE SCHEDULE**

CHECK	DAILY	WEEKLY	MONTHLY
Check tightness of upper chamber hold down handles. Refer to Section 6, Cutting Chamber	X		
Check tightness of screen chamber wedges. Refer to Section 6, Screen Replacement	X		
Check infeed flap position/condition. Refer to Section 6 Periodic Maintenance	X		
Check interlock actuator switch screws position/condition. Refer to Section 6 Screen Replacement/Cutting Chamber Access	X		
Do housekeeping around work area	X		
Check tightness of upper pivot arm screws. Refer to Section 6 Periodic Maintenance		X	
Check jackscrew travel adjustment – internal limit switches and chamber mounting bracket limit switch. Refer to Section 4, Setting And Adjusting Chamber.Cradle3 Jackscrews		X	
Check hydraulic assembly –limit switches, hoses, pivot pins, brackets ensure they are tight Refer to Section 4-36 Setting And Adjusting hydraulic opening.		X	
Check the pivot pins and locknuts for the jackscrews to ensure they are tight. Refer to Section 6 Periodic Maintenance		X	
Inspect overall condition of jackscrews. Refer to Section 6 Periodic Maintenance		X	
Check Zero Speed Sensor operation. Refer to Section 3, Installation-Test the Zero Speed Sensor		X	
Check knife clearance and wear. Refer to Section 4, Adjusting and Replacing the Rotor Knives.		X	
Check that rotor and bed knife bolts have proper torque. Refer to Section 4, Adjusting and Replacing the Rotor Knives/Adjusting and Replacing the Bed Knives.		X	
Lubrication: More frequent lubrication may be required, refer to Section 6, Lubrication and Periodic maintenance			X
Belt tension. Refer to Section 4, Settings and Adjustments			X

## **MAINTENANCE**

### **SECTION 6-2** *Periodic Maintenance*

#### **LUBRICATION**

Motor lubrication: check the tag from the motor manufacturer.

Main rotor bearings are lubricated at the factory but need re-lubrication periodically. Grease fittings are provided for re-lubrication and are located on the right and left-hand bearing housings. Lubricate every month or 750 hours, while the machine is running, with approximately 84 grams (3 oz.) of grease. Use a lithium-based grease conforming to NLGI grade #1. More frequent lubrication may be required in severe applications.




#### **KNIFE SCREW TORQUE**

Weekly, check the torque on the knife hold-down screws for both the rotor and the bed knives. Refer to Section 4, Settings and Adjustments, for torque specs.

#### **BELT TENSION**

During the initial run-in period, check the belt tension at least two times in the first two days of operation. After the initial run-in period check the belt tension on the drive monthly. Refer to the subsection entitled Drive Belt Replacement and Adjustment in Section 4, Settings and Adjustments.

#### **SCREEN CONDITION**

-  Inspect the screen monthly for wear and cracks. Check the holes in the screen for elongation.
-  Turn the screens front-to-back monthly to even out the wear.
-  Refer to the instructions later in this section for screen access information.

## **MAINTENANCE**

### **SECTION 6-3** *Periodic Maintenance*

#### **INFEED FLAP CONDITION**




Daily, check the overall condition of the (3) infeed flaps, pictured in Section 2, Right Quarter View. Check for wear, or tears in the flap, or if pieces are missing. Replace them if you see damage. Check the rods that support the flaps: they should be in good condition and in proper location. Any flap and or its mounting hardware that is deteriorated should be replaced to assure proper machine performance and operation.

#### **UPPER CHAMBER PIVOT ARM-SCREWS**

Weekly, check the tightness of the (4) socket head cap screws that hold the upper chamber pivot arm. Torque the screws to 232 ft lbs/315 Nm. Refer to Section 2 Left Rear Quarter View for location.

#### **HYDRAULIC CYLINDER/JACKSCREW INSPECTION -PIVOT PINS AND LOCKNUTS**

Weekly, check the overall condition of the hydraulic cylinders/jackscrews, shown in Section 2, Right/Rear Quarter View. If you find problems with the hydraulic cylinders or jackscrews or their mounting hardware, do not operate the units. Call for maintenance to correct the problems.

-  Visually check the jackscrew boot and screw in its extended position.
-  Check the condition and position of the pivot pins at top and bottom ends of the hydraulic cylinders or jackscrews.
-  Check that of the (2) nuts at the ends of the pivot pins are tightly locked together.



## MAINTENANCE

### SECTION 6-4 *Screen Replacement*

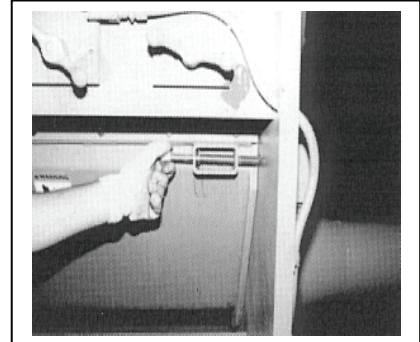
#### WORK SAFELY



- ✚ TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag out of Energy Sources).
- ✚ If it is not possible to lock out the power, have an electrician remove the fuses
- ✚ Make sure the rotor has come to a complete stop
- ✚ The hydraulic cylinders or jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the hydraulic cylinders or jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.
- ✚ Wear gloves to protect against injury from the rotor or bed knives

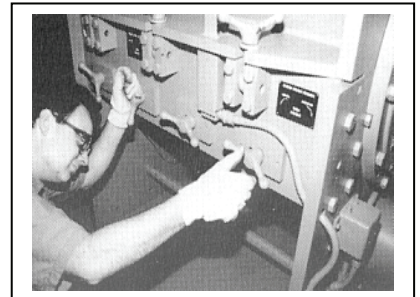
#### **OPEN THE SCREEN CRADLE INTERLOCK**

- ✚ Disengage the interlock actuator screw with a box wrench or ratchet wrench.
- ✚ Make sure the end of the actuator screw is visible and clear of any contact.
- ✚ When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.



#### **RETRACT THE SCREEN CRADLE RETAINERS**

- ✚ Turn the screen cradle retainer knobs clockwise until they stop. (This retracts the support wedges from beneath the screen cradle).
- ✚ When the wedges are fully retracted, rods extend so that their ends are flush with the surface of each of the retaining knob mounting plates.



## MAINTENANCE

### SECTION 6-5 *Screen Replacement*

**SEE SECTION 6-12 PAGE 90 FOR SCREEN CRADLE LOWERING INSTRUCTIONS**

BEWARE OF ROTOR KNIVES



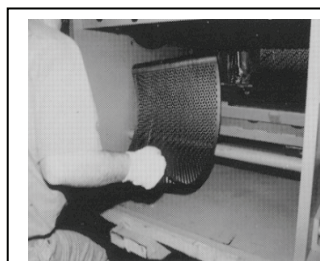
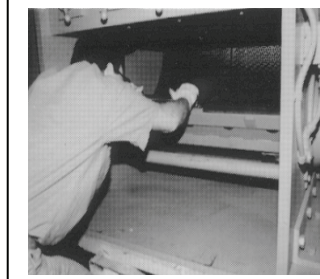
- Avoid contact with the rotor knives, which are just above the screen. The cutting edges are very sharp.
- Wear gloves to avoid injury when working in this area.

## MAINTENANCE

### SECTION 6-6 *Screen Replacement*

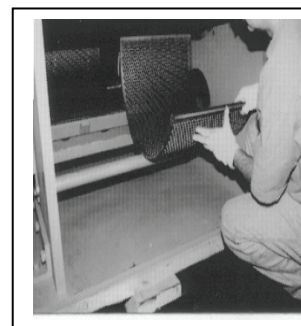
#### **REMOVE THE SCREEN**

- ✚ The screen is divided into segments. Remove one segment at-a-time.
- ✚ Grasp it on its near edge and raise the edge by allowing the screen to slide in the cradle.
- ✚ Pull it toward you slowly allowing it to slide over the edge of the screen cradle then, let it down onto the machine support bar as you continue to pull it toward you. Be careful not to hit the rotor knives with the trailing end of the screen.
- ✚ Ease it from the support bar to the floor and remove it from the front of the granulator.
- ✚ Repeat the foregoing steps for each segment of the screen.



#### **REPLACE THE SCREEN**

- ✚ Place the screen on the floor close to, and in front of the machine. Set it on its circular surface with its long dimension parallel with the machine.
- ✚ Slide it along the floor until it touches against the support bar underneath the machine.
- ✚ Align one edge with the edge of the machine cradle.
- ✚ Roll the screen toward you by pushing down on the near side and then slide it up against the support bar.
- ✚ Roll the backside of the screen up over the machine support bar until its weight shifts to the support bar. Work it back until it nestles between the support bar and the cradle.
- ✚ Push down on the near side until the screen slides around with the front side low and the backside in a position that will allow you to "roll" the screen up onto the screen cradle.





(Continued on next page)

## MAINTENANCE

### SECTION 6-7 *Screen Replacement*

#### **REPLACE THE SCREEN** (Continued from previous page)

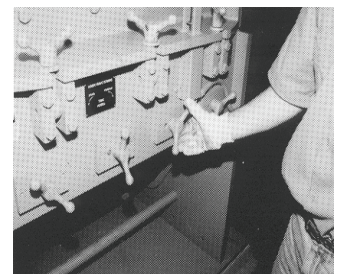
-  Guide the screen carefully as you "roll" it into the cradle, then slide it down around the cradle until you can hang the front lip of the screen over the front edge of the cradle. Be careful not to hit the rotor knives with the far end of the screen.
-  Repeat the foregoing steps for each segment of the screen.



**SEE SECTION 6-13 PAGE 91 FOR SCREEN CRADLE RAISING INSTRUCTIONS**

#### **CLOSE THE SCREEN CRADLE RETAINERS**

Turn the screen cradle retainer knobs counterclockwise until they stop. (This returns the retainer wedges to their positions under the screen cradle where they lock the cradle in place.)



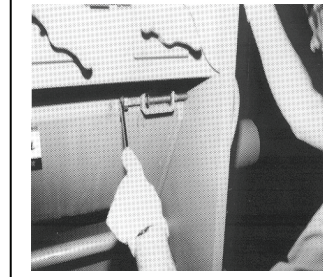
## MAINTENANCE

### SECTION 6-8 *Screen Replacement*

#### **CLOSE THE SCREEN CRADLE INTERLOCK**

- ✚ Engage the interlock screw by turning it clockwise with a box wrench or a ratchet wrench.
- ✚ Make sure the interlock actuator screw is fully seated against the top surface of its housing.

When engaged, the interlock switch closes the electrical control circuit to the machine and allows it to operate.



#### **RESTART THE GRANULATOR**

- ✚ If necessary to replace the fuses, call an electrician to do it.
- ✚ UNLOCK AND TURN ON the main power.
- ✚ Remove the OUT OF SERVICE tag.
- ✚ Start the granulator by depressing the start pushbutton on the electrical cabinet.

## MAINTENANCE

### SECTION 6-9 *Cutting Chamber Access*

WORK SAFELY

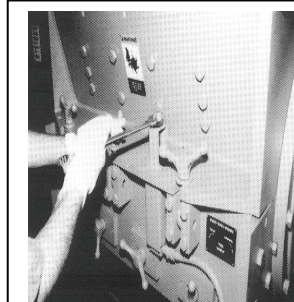


- ✚ TURN OFF AND LOCKOUT the power per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag out of Energy Sources).
- ✚ If it is not possible to lock out the power, have an electrician remove the fuses.
- ✚ Make sure the rotor has come to a complete stop.
- ✚ The hydraulic cylinders/jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.
- ✚ Wear gloves to protect against injury from the rotor or bed knives.

#### **OPEN THE CUTTING CHAMBER INTERLOCK**

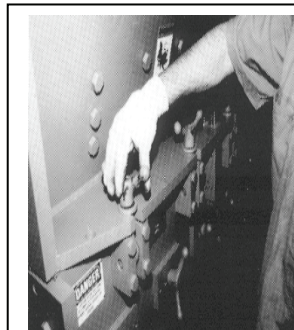
- ✚ Disengage the interlock actuator screw with a box wrench or a ratchet wrench.
- ✚ Make sure the end of the interlock actuator screw is visible and clear of any contact.

When disengaged, the interlock opens the electrical control circuit to the motor and prevents the machine from running.



#### **RELEASE THE CUTTING CHAMBER FASTENERS**

- ✚ Turn the hold-down clamps counterclockwise to loosen them.
- ✚ Swing the hold-down clamps toward you until they are disengaged from the cutting chamber housing.



## MAINTENANCE

### SECTION 6-10 *Cutting Chamber Access*

#### JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

#### OPEN THE CUTTING CHAMBER



#### **OPEN THE CUTTING CHAMBER WITH JACKSCREWS**

The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jackscrews DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

- ✚ Make sure no one is near the jackscrew or hopper during operation.
- ✚ Actuate the cutting chamber jackscrew from the jackscrew console by turning the CC/Hopper (Cutting Chamber/Hopper) switch to the RAISE position. Hold the switch till the hopper stops.



#### OPEN THE CUTTING CHAMBER



#### **OPEN THE CUTTING CHAMBER WITH HYDRAULICS**

You will need to access the cutting chamber before initial startup and for various maintenance procedures. Before accessing the cutting chamber, make sure no one is near the hydraulic cylinders or hopper.

The hydraulic cylinders should not operate until the rotor is completely stopped. If the hydraulic system does operate while the rotor is still turning, immediately shut down the machine and call for maintenance to diagnose the system to find the fault.

Actuate the cutting chamber hydraulic cylinders from the open/close control panel by turning the CC/Hopper (Cutting Chamber/Hopper) switch to "RAISE" position. Hold the switch until the hopper stops, then release and return the switch to the off position.

## MAINTENANCE

### SECTION 6-11 *Cutting Chamber Access*

CLOSE THE CUTTING CHAMBER

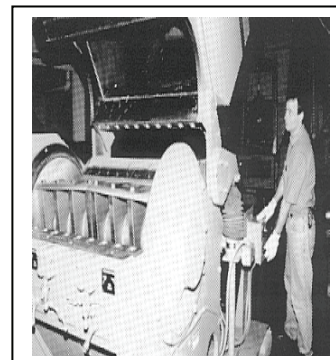


#### **CLOSE THE CUTTING CHAMBER WITH JACKSCREWS**

Make sure that no one is near the jackscrew or hopper.  
Clear the mating surfaces of the cutting chamber of any debris that might prevent tight closure.

REMOVE THE ROTOR LOCATING PIN if it is installed.

At the jackscrew console, turn the CC/Hopper (Cutting Chamber/Hopper) switch to the LOWER position. Hold the switch till the hopper stops.



CLOSE THE CUTTING CHAMBER



#### **CLOSE THE CUTTING CHAMBER WITH HYDRAULICS**

After completing any maintenance or adjustments inside the cutting chamber, use the following procedure to close the cutting chamber and resume use of the granulator.

Make sure that no one is near the hydraulic cylinders or hopper, and clear the mating surfaces of the cutting chamber of any debris that might prevent tight closure.

REMOVE THE ROTOR LOCATING PIN (if it is installed).



Actuate the cutting chamber hydraulic cylinder from the open/close control panel by turning the CC/Hopper switch to the “LOWER” position. Hold the switch until the hopper stops, then release and return the switch to the off position.

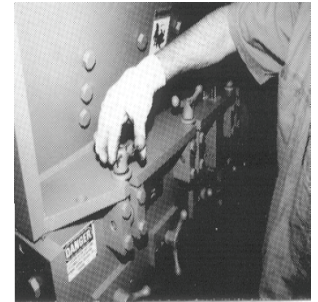


## MAINTENANCE



### SECTION 6-11 *Cutting Chamber Access*

#### **FASTEN THE CUTTING CHAMBER**

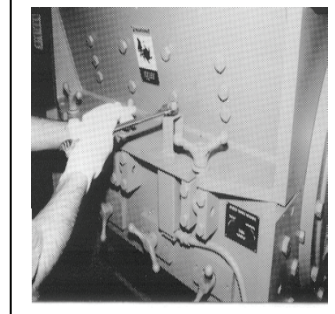
-  Raise the hold-down clamps to their upright positions.
-  Turn the knobs clockwise until they are tight against the chamber housing.







#### **CLOSE THE CUTTING CHAMBER SAFETY INTERLOCK**

-  Engage the safety interlock by turning the actuator screw clockwise with a box wrench or a ratchet wrench.
-  Make sure the screw is fully seated against the top surface of its housing.

When engaged, the interlock closes the electrical control circuit to the motor and allows the machine to run.



#### **RESTART THE GRANULATOR**

-  If necessary to replace the fuses, call an electrician to do it.
-  UNLOCK AND TURN ON the main power.
-  Remove the OUT OF SERVICE tag.
-  Start the granulator by depressing the start pushbutton on the electrical cabinet.

## MAINTENANCE

### SECTION 6-12 *Cutting Chamber Access*

#### JACKSCREW OPERATION



When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.



#### LOWER THE SCREEN CRADLE



#### LOWERING THE SCREEN CRADLE WITH JACKSCREWS

The jackscrews, which open the machine, should not operate until the rotor is completely stopped. If you discover that the jack- screws DO operate while the rotor is still turning, immediately shut down the machine and call for maintenance to adjust it.

Make sure no one is near the jackscrew or the cradle during operation.

-  Actuate the screen cradle jackscrew from the jackscrew console by turning the selector switch to LOWER.
-  Hold the switch in position until the cradle stops. The jackscrew motor shuts down when it reaches the end of its travel.

#### LOWER THE SCREEN CRADLE



#### LOWERING THE SCREEN CRADLE WITH HYDRAULICS

You will need to access the screen cradle before initial startup and for various maintenance procedures. Before accessing the screen cradle, make sure no one is near the hydraulic cylinders or hopper.

The hydraulic cylinders should not operate until the rotor is completely stopped. If the hydraulic system does operate while the rotor is still turning, immediately shut down the machine and call for maintenance to diagnose the system to find the fault.

Actuate the screen cradle hydraulic cylinders from the open/close control panel by turning the screen cradle selector switch to the "LOWER" position. Hold the switch until the cradle stops at its fully open position, and then release and return the switch to the off position.

## MAINTENANCE

### **SECTION 6-13** *Cutting Chamber Access*

#### JACKSCREW OPERATION





When you REVERSE the jackscrew operating direction, always ALLOW THE JACKSCREW MOTOR TO COME TO A COMPLETE STOP. Release the control switch and allow a minimum of 5 seconds before switching to the opposite operating position. If you don't allow this pause, the JACKSCREW AND OTHER COMPONENTS MAY BE SEVERELY DAMAGED.

#### RAISE THE SCREEN CRADLE



#### **RAISING THE SCREEN CRADLE WITH JACKSCREWS**

Make sure that no one is near the jackscrew or screen cradle during operation.

-  From the jackscrew console, raise the cradle approximately two-thirds of its full travel by turning the SCREEN CRADLE selector switch to the RAISE position.
-  Check the screens to make sure that they are seated and properly positioned in the cradle. Continue raising the cradle by tuning the selector switch and holding it until the screw-jack stops.

#### RAISE THE SCREEN CRADLE



#### **RAISING THE SCREEN CRADLE WITH HYDRAULICS**

From the open/close control panel, raise the cradle approximately two-thirds of its full travel by turning the Screen Cradle selector switch to the “RAISE” position.

Check the screens to make sure that they are seated properly in the cradle. Continue raising the cradle by turning the switch until the cradle is fully closed. Return the switch to the off positions.

# MAINTENANCE

## SECTION 6-14 *Knife Sharpening*

### ROTOR KNIFE SHARPENING

The rotor knives must be sharpened to within 0.003" (0.076 mm) of each other. Greater dimensional variations prevent the proper setting of the knife gap and may create other serious complications.

Grinding the cutting edge until it is free of nicks can be wasteful. It is not harmful to allow small nicks to remain in the cutting edge

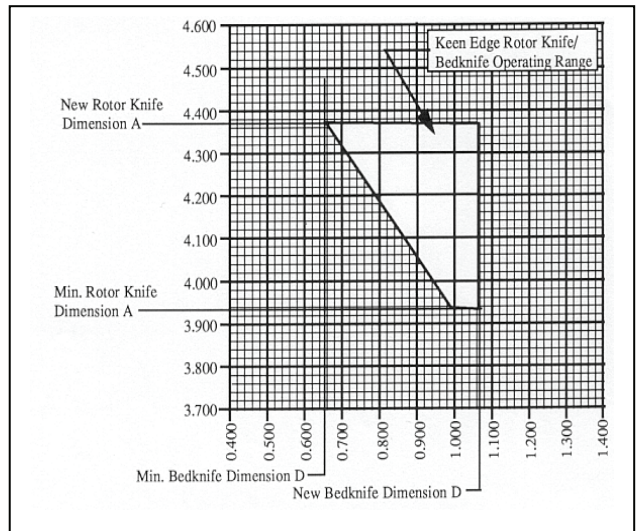
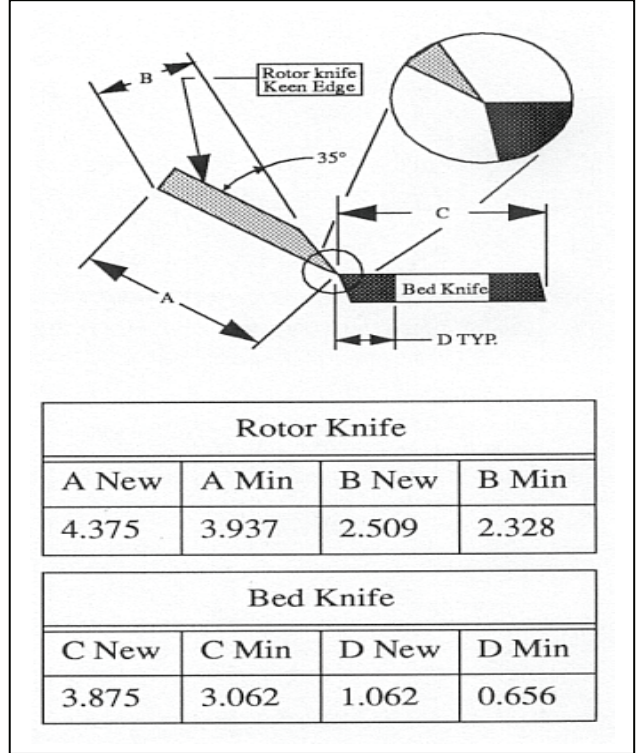
### WARNING

Do not install rotor knives, which are smaller than the minimum dimension shown because the fasteners, which secure these knives will interfere with the cutting circle. The rotor will not be able to rotate and the bed knives will be damaged.

It is important to note that the minimum dimensions given for the rotor knife and bed knife cannot be combined simultaneously to produce a cutting combination. The grinding charts shown below and on the following page indicate the rotor knife and bed knife combinations that will work for each type of rotor knife.

EXAMPLE: A keen edge rotor knife with 4.200 inch " A " dimension will work only with bed knives which have "D" dimensions of 0.790" or greater.

NOTE: Replacement knife sets and knife re sharpening services are available from Cumberland Engineering. Contact the Customer Service Department at 508-399-6400 or 800-229-2919.



# MAINTENANCE

## SECTION 6-15 *Knife Sharpening*

### **BED KNIFE SHARPENING**

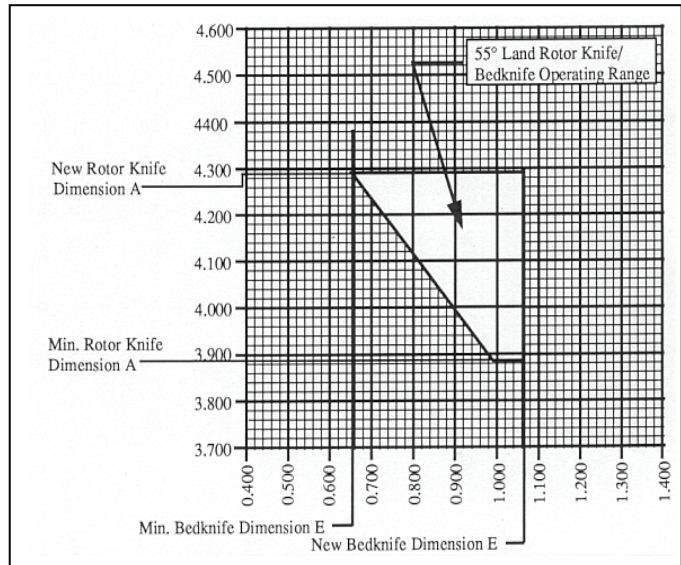
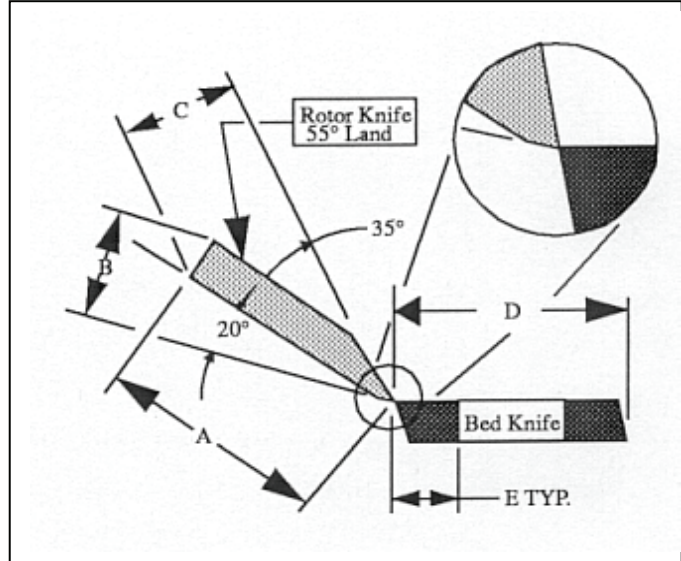
Each bed knife is provided with two cutting edges. When the exposed edges become blunt, the knives can be turned over and repositioned to present the new cutting edges.

It is not necessary to grind bed knives to the closely matched tolerance of the rotor knives and as with the rotor knives, small nicks in the cutting edges will not seriously affect knife cutting efficiency. Bed knives smaller than the minimum dimension shown must be replaced along with their fasteners.

It is important to note that the minimum dimensions given for the rotor knife and bed knife cannot be combined simultaneously to produce a cutting combination. The grinding charts shown below and on the previous page indicate the rotor knife and bed knife combinations that will work for each type of rotor knife.

**EXAMPLE:** A 55° land rotor knife with a 4.200 inch "A" dimension will work only with bed knives having an "E" dimension of 0.730 or more.

**NOTE:** Replacement knife sets and knife re-sharpening services are available from Cumberland Engineering. Contact the Customer Service Department at 508-399-6400 or 800-229-2919.



Rotor Knife					
A New	A Min	B New	B Min	C New	C Min
4.288	3.883	2.113	1.976	2.509	2.277

Bed Knife			
D New	D Min	E New	E Min
3.875	3.062	1.062	0.656

# **TROUBLESHOOTING**

## **SECTION 7-1**

### *Overview*

#### **OVERVIEW**

This section is intended to serve as a guide in checking possible problems that may occur with the operation of your granulator. **SAFETY**

The most important ingredient in any machinery operation is a constant adherence to sound safety practices. The best way to assure safety in any activity that involves troubleshooting or repairing the granulator is to retain complete control of the machine.

**TURN OFF AND LOCK OUT THE POWER** per OSHA 1910.147 OR ANSI Z244.1-1982 (Lockout/Tag out of Energy Sources). If this is not possible, have an electrician remove the fuses.

#### **TEST EQUIPMENT**

The use of quality test equipment cannot be over-emphasized when troubleshooting is required. Secure a good ammeter, one with a capacity of at least twice the AC and DC current that can be encountered in the machine. Use a voltmeter that has a minimum impedance of 5,000 ohms per volt on the AC scale and 20,000 ohms per volt on the DC scale. Popular combination meters, YOM and YTM, can provide the necessary functions.

#### **LOCATING TROUBLE**

When you are correcting malfunctions, it is recommended that you check the associated circuitry, and assemblies to ensure that there are no other defective devices. This practice assures that a premature replacement of a pan does not result in a repeat of the malfunction and possible damage to the new pan. Refer to the wiring diagrams and schematics for information about these pans. Full size assembly drawings and wiring diagrams specific to your unit are usually included with the manual but under separate cover.

Locating mechanical problems, should they occur, is relatively straightforward. When necessary, refer to Section 8, Pans Lists and Drawings.

#### **TROUBLESHOOTING CHART**

Troubleshooting procedures are listed in the table that follows. The first column lists the apparent problem or symptom, the second column contains the probable cause, and the suggested remedy is listed in the third column.

## TROUBLESHOOTING

### SECTION 7-2 *Processing Faults*

<b>PROBLEM</b> <i>Processing Faults</i>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
A. Material building up below screen	1. Pneumatic discharge blower not running	1. Start the blower
	2. Damper on discharge blower not open enough	2. Adjust the damper (on opposite side of machine from blower)
	3. Damper line is blocked	3. Open line and remove block
B. Stalling	1. Overfeeding	1. Reduce feed rate
	2. Partial or complete screen blockage	2. Remove screen, clear and inspect for damage
	3. Insufficient tension on V-belt drive, slippage and burning	3. Check belt tension and adjust as required
	4. Badly blunted or damaged knives	4. Install re-sharpened or new knives as required
	5. Knife gap setting is too wide	5. Check knife gap clearances
	6. Installation fault, motor is running in reverse direction	6. Check direction arrow and reset electrical connections to correct rotational direction
	7. Safety interlock is inoperative	7. Tighten safety interlock actuator screw
C. Material overheating	1. Check items 1, 2, 4, 5 and 6 under "Stalling"	1. Follow remedies listed for each item
	2. Screen size is too small	2. Increase the screen size
	3. When feeding the material, bed knife shield on rotor down stroke is incorrectly set	3. Check bed knife projection beyond shield. Set it to 1-2" (0.80 mm) for film and 1/16" (1.6 mm) or thicker materials
	4. When granulating rubber, insufficient talc, causing freshly cut surfaces to re-adhere	4. Increase talc percentage rate of feed
	5. Blockage in pneumatic discharge line	5. Check direction of blower rotation. Check venturi and line/or transition piece for blockage

## TROUBLESHOOTING

### SECTION 7-3 *Mechanical Faults*

<b>PROBLEM</b> <i>Mechanical Faults</i>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
A. Bearing overheating	1. Excessive wear on the V-Belt drive	1. Check belt tension and adjust as necessary
	2. Inadequate lubrication	2. Check lubrication frequency and the recommended lubricants in motor and rotor bearings
	3. Dirt/Contamination in bearing	3. Eliminate source of contamination
B. Visible cracks in knives	1. Incorrect grinding procedure or incorrect grinding wheels in use	1. Check grinding procedures and contact a Cumberland Service Engineer
C. Knives moving on seats	1. Uneven knives seat surfaces	1. Clean knife seats to provide maximum bearing surface
	2. Loose knife screws	2. Tighten to correct torque, per section 4
	3. Stretched knife screws	3. Knife screws should not be used more than six times. Renew them if there is evidence of stretching
D. Knives breaking	1. Possibly due to cracks caused by incorrect grinding	1. Refer to problem B. "Visible cracks in knives" (above left)
	2. Abnormally heavy material	2. Contact a Cumberland Service Engineer
	3. Contaminated input material	3. Inspect the material for contaminants and foreign matter
E. Excessive knife wear	1. Open knife setting	1. Reset as detailed in alternate material
	2. Abrasive materials	2. Contact a Cumberland Service Engineer
F. Screens wearing	1. Incorrectly seated	1. Check that the screen is seated correctly and fully on its cradle
	2. Abrasive materials being granulated	2. Obtain special alloy or heat treated screens



## TROUBLESHOOTING

### SECTION 7-4 *Electrical Faults*

<b>PROBLEM</b> <i>Electrical Faults</i>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
A. Motor fails to start	1. Power supply failure.	1. Check fuses.
	2. Starter is inoperative.	2. Check supply mains. Also, check starter contacts for burning, replace if necessary.
	3. Starter overloads cut out.	3. Check current requirements on motor nameplate and adjust.
	4. Safety interlock is inoperative.	4. Check and adjust as needed.
B. Motor starts, but will not take load.	1. Too much belt tension.	1. Check belt tension and adjust as necessary. Refer to section 4.
	2. Motor is improperly wired.	2. Check terminal connection with manufacturers connection diagram in conduit box and adjust as necessary.
	3. Defective starter winding.	3. Check current in each phase with an ammeter. If there is marked difference in current on any phase, contact the motor manufacturer.
C. Motor starts when disconnected from load, but will not when connected.	1. Worn bearings.	1. Check and replace if necessary, in accordance with manufacturers literature.
D. Jackscrew does not operate after extended running.	1. Over-temperature cutout is activated.	1. Allow cooling for 10 minutes, and then retrying.
E. Hydraulic cylinders or Jackscrews operate while rotor is in motion.	1. Zero speed switch is inoperative.	<ol style="list-style-type: none"> <li>1. Check zero speed sensor position.</li> <li>2. Check zero speed electrical circuit.</li> </ol>
F. Jackscrew motor continues running after jackscrew reaches its normal extended or retracted position.	1. Limit switches not properly set.	<ol style="list-style-type: none"> <li>1. Set the limit switches using the procedure in section 4.</li> <li>2. Check the electrical circuit.</li> </ol>
G. Cutting chamber only – Jackscrew motor continues running after motion of cutting chamber stops – Chamber may be open or closed.	1. Limit switch on mounting bracket not properly set.	<ol style="list-style-type: none"> <li>1. Adjust the mounting bracket switch. Refer to section 4.</li> <li>2. Check electrical circuit</li> </ol>
I. Hydraulic Pump Motor Continues to run after Chamber or cradle closes.	1. Limit switches not properly set.	<ol style="list-style-type: none"> <li>1. Check limit switches using procedure in Section 4</li> <li>2. Check the electrical circuit.</li> </ol>

# PARTS LIST AND DRAWINGS

**SECTION 8-1**  
*Recommended Spare Parts*

## **BP2400 SERIES**

**Table 1: Recommended Spare Parts**

Model	2428	2439	2456	Material
ITEM	Qty	Qty	Qty	Material
Rotor Knife (Depending on Rotor)	6/10	6/10	6/10	HCHC
Bed Knife	4	4	4	HCHC
Rotor Knife Screw (Depending on Rotor)	18/30	24/40	36/60	* Property Class 10.9 - M20 X 50 mm
Bed Knife Screw	16	20	28	* Property Class 10.9 - M20 X 90 mm
Bed Knife Washer	16	20	28	Hardened
Screen	2	2	3	Mild steel, 3/8" dia. hole - Standard
Rotor Bearing	2	2	2	130 mm bore
Drive Belt	4	-	-	5VX1600 - quantity for standard 60 hp drive
		5		5VX1600 - quantity for standard 75 hp drive
			8	5VX1600 - quantity for standard 125 hp drive
Adjusting Screw - Bed Knife	8	8	8	Push-pull type
<p>NOTES:</p> <p>* Din No. 961-10</p> <p>When ordering spare parts for your granulator, please have the model and serial number on hand.</p> <p>Please call one of the following locations.</p> <p>Cumberland Engineering, So. Attelboro, MA -- 508-399-6400</p> <p>Midwest Service Center, Columbus, OH -- 614-436-7713/7714</p> <p>West Coast Service Center, Ontario, CA -- 909-460-4130/4131</p> <p>Southeast Service Center, Spartanburg, SC -- 864-585-2588</p> <p>Central Service Center, Kansas City, KA -- 913-327-1966</p>				

## PARTS LIST AND DRAWINGS

### SECTION 8-2

*Parts Identification Drawing No. A-48050  
(Sheet 1 of 4)*

**Table 2. Parts Identification**

Model	2428	2439	2456	
Item	Qty	Qty	Qty	Material
1	1	1	1	Assembly, Chamber
2	1	1	1	Housing, Bearing- Right
3	1	1	1	Housing, Bearing-Left
4	2	2	2	Clamp, Upstroke knife
5	1	1	1	Shield, Knife, Downstroke-LH
6	1	1	1	Shield, Knife, Downstroke-RH
9	3	4	5	Assembly, Wedge
10	2	2	2	Rail, Mounting
11	1	1	1	Retainer , Cap, Closed
12	1	1	1	Retainer , Cap, Open
13	1	1	1	Assembly, Cradle
14	2	2	2	Pin, Pivot, Short
15	2	2	2	Retainer, Bearing
17	1	1	1	Spacer, Sheave
18	2	2	2	Bearing, Altered
19	1	1	1	Impeller, Rotor, LH
20	1	1	1	Impeller, Rotor, RH
21	1	1	1	Spacer, Screen, LH
22	1	1	1	Spacer, Screen, RH
23	1	1	1	Pin, Dowel
24	1	1	1	Bracket, Pivot
25	1	1	1	Bracket
26	1	1	1	Assembly, Bracket
27	8	8	8	Assembly, Screw
28	1	1	1	Assembly, Interlock
29	1	1	1	Arm, Pivot, Chamber
30	1	1	1	Assembly, Interlock
31	1	1	1	Key
32	2	2	2	Pin, Spirol
33	40	42	46	Washer, Lock, M20
34	14	14	14	Screw, HHC, M 20 x 75 mm Lg.
35	2	2	2	Fitting, Lube
36	2	2	2	Plug, Pipe
37	2	2	2	Bearing, 130 mm Bore

Note 1. Parts list continues on next page  
 Note 2. Refer to drawings that follow for parts identification.

## PARTS LIST AND DRAWINGS

### SECTION 8-2

*Parts Identification Drawing No. A-48050*

*(Sheet 2 of 4)*

**Table 2. Parts Identification (continued)**

Model	2428	2439	2456	
Item	Qty	Qty	Qty	Material
38	16	20	28	Screw, HHC, M20 X 90 mm Lg. Gr 10.9
39	6	6	6	Screw, SHC, M12 X 30 mm Lg.
40	6	6	6	Screw, HHC, M12 X 35 mm Lg.
41	6	6	6	Screw, FHDS, M8 X 20 mm Lg.
42	12	12	12	Screw, SHC, M12 X 45 mm Lg. Gr. 12.9
43	4	4	4	Screw, HHC M16 X 50 mm Lg.
44	4	4	4	Screw, HHC M16 X 30 mm Lg.
45	4	4	4	Ring Retainer
46	4	4	4	Screw, SHC, M16 X 90 mm Lg. Gr. 12.9
47	6	6	6	Washer, Lock, M16
48	5	7	9	Screw, HHC M8 X 16 mm Lg.
51	2	2	2	Screw, SHC M16 X 40 mm Lg.
52	2	2	2	Washer, Plain, M16
53	8	8	8	Screw, HHC, M20 X 40 mm Lg.
54	1	1	1	Sensor, Zero Speed
55	10	10	10	Screw, HHC, M20 X 50 mm Lg.
58	4	4	4	Screw, HHS, M24 X 100 mm Lg., Gr 10.9
59	4	4	4	Washer, Lock, M24
60	1	1	1	Screw, Shoulder, 3/4D. x 2-1/4 Lg.
61	1	1	1	Screw, Shoulder, 3/4D. x 3-3/4 Lg.
62	4	4	4	Nut, Jam, 5/8
63	8	10	14	Screw, HHC, M20 X 65 mm Lg. Full Thread
64	1	1	1	Actuator, Electro-mech. (Cradle)
65	1	1	1	Actuator, Electro-mech. (Upper Chamber)
67	16	20	28	Washer, HT
68	1	1	1	Bushing, Taper Sheave
69	1	1	1	Sheave, Rotor
70	4	4	4	Washer, HT, 3/4 ID

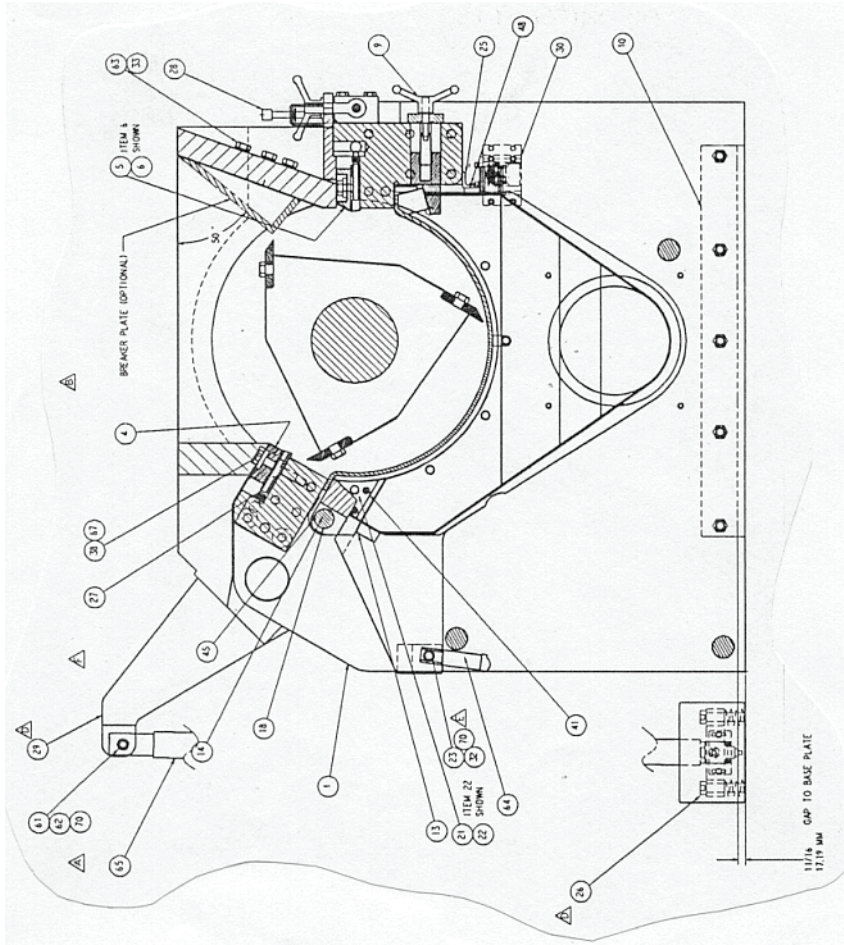
Note 1. Refer to drawings that follow for parts identification

# PARTS LIST AND DRAWINGS

## SECTION 8-2

*Parts Identification Drawing No. A-48050*

*(Sheet 3 of 4)*

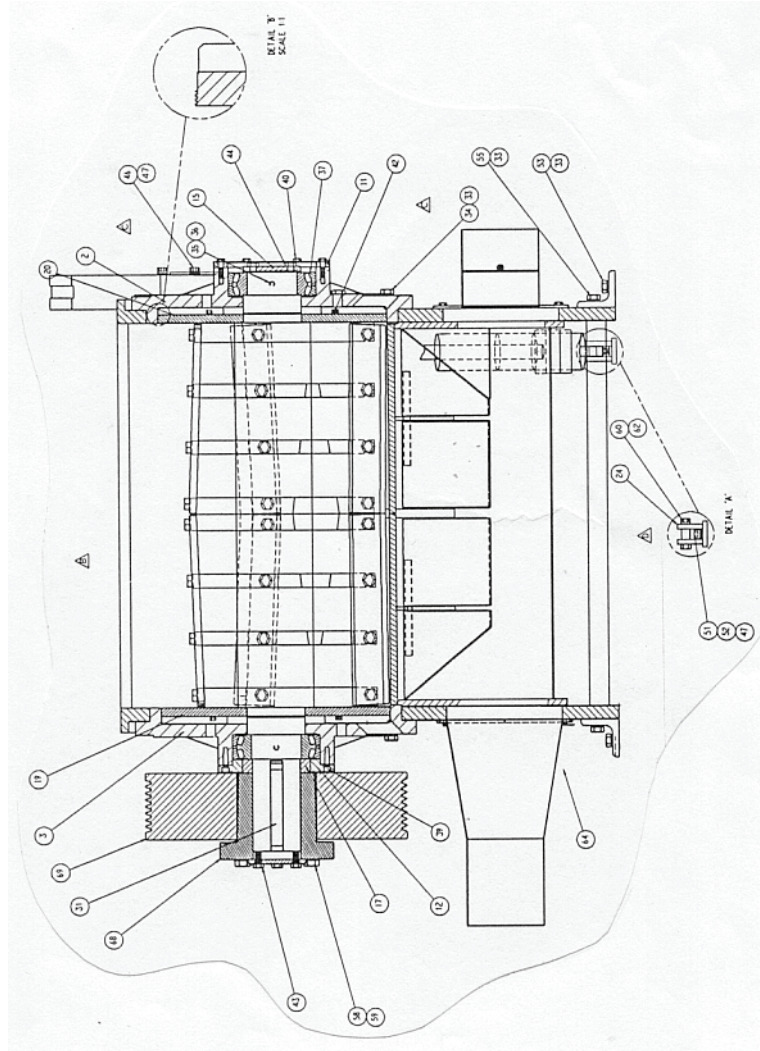


# PARTS LIST AND DRAWINGS

## SECTION 8-2

Parts Identification Drawing No. A-48050

(Sheet 4 of 4)

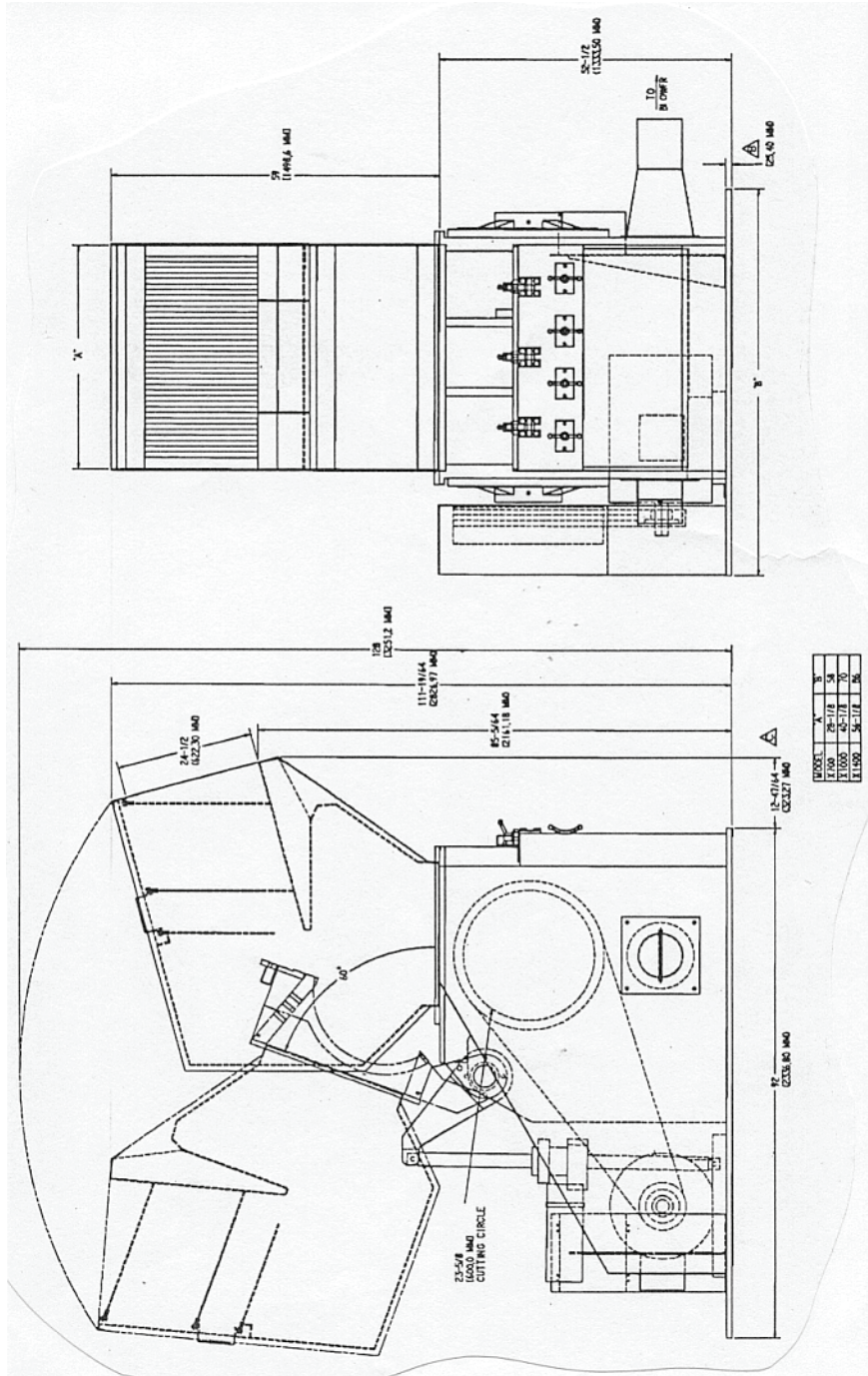


# PARTS LIST AND DRAWINGS

## SECTION 8-3

*Parts Identification Drawing No. A-48150*

*(Sheet 1 of 1)*

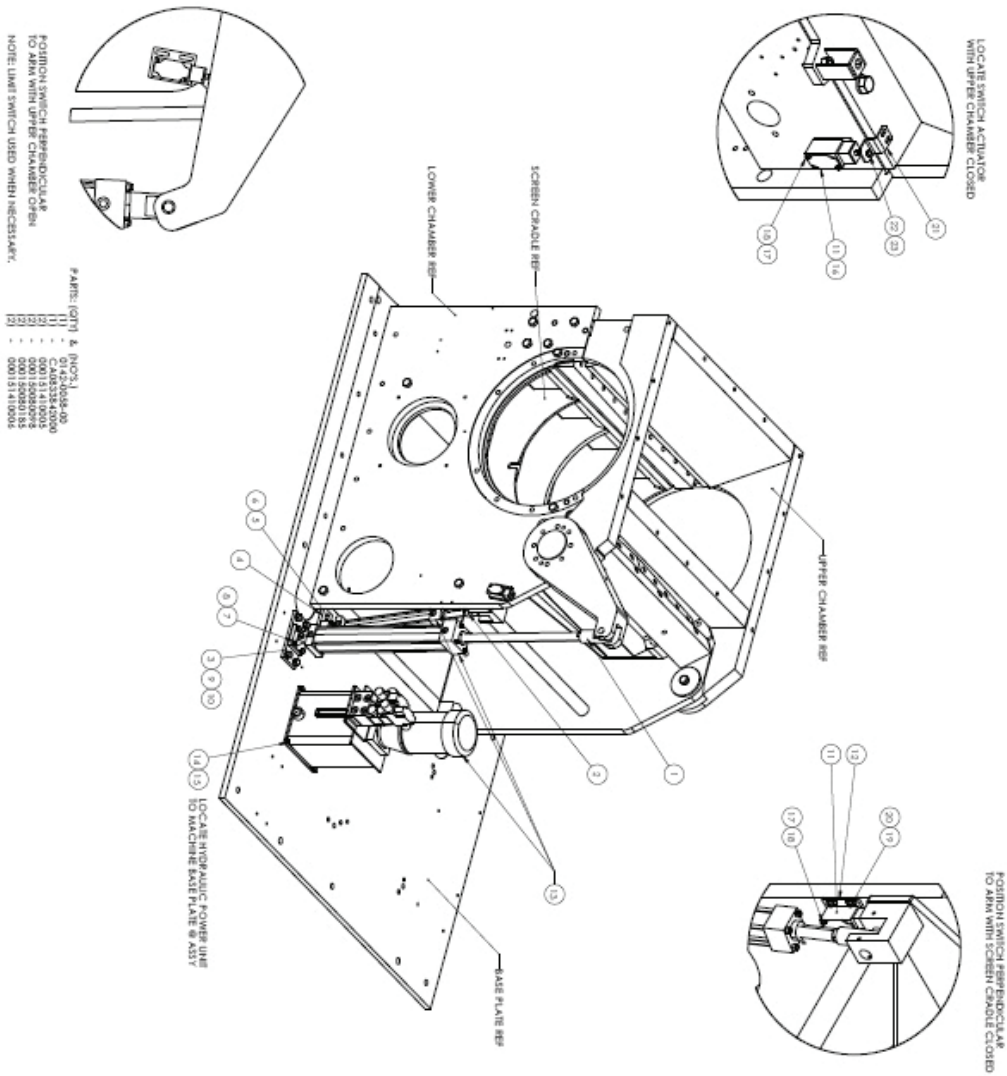


# PARTS LISTS AND DRAWINGS

## SECTION 8-4

Part Identification Drawing No.348070

(Sheet 1 of 1)



NOTE - HYDRAULIC SYSTEM INCLUDES:  
 HYDRAULIC POWER UNIT MADE UP OF:  
 RESERVOIR, MOTOR, PUMP AND VALVE.  
 LARGE HYDRAULIC CYLINDER (UPPER CHAMBER)  
 SMALL HYDRAULIC CYLINDER (SCREEN CRADLE)  
 HYDRAULIC HOSES AND FITTINGS (NOT SHOWN)

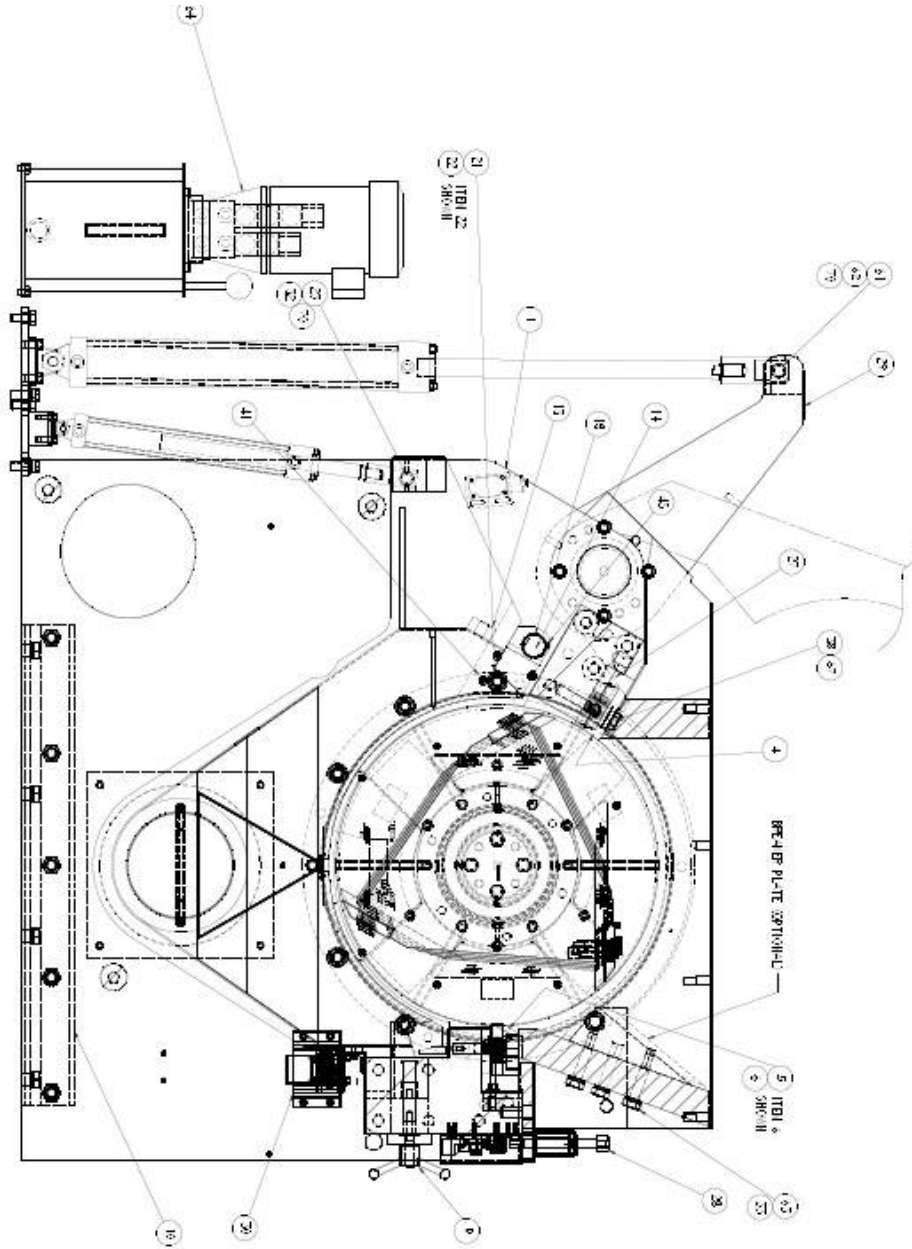
ITEM NO.	QTY.	PART NUMBER	DESC-PTION	REMARKS
1	1	0003402000	ROD END-UPPER CHAMBER	
2	1	0003402100	ROD END-SCREEN CRADLE	
3	1	0003402200	SPACER-LARGE CYLINDER	
4	1	0003402300	SPACER-SMALL CYLINDER	
5	4	0001500001	WASHER - 1.25 X .25 MM LONG	
6	4	0001500002	WASHER LOCK - 1/8"	
7	4	0001500003	SCR-HHC-MS - M12 - 1.25 X 25MM	
8	4	0001500011	WASHER LOCK - M12	
9	4	0001500047	M16 X 2.0 X 35MM LONG	
10	4	0001500016	WASHER LOCK - .435	
11	2	0004200500	SWITCH LIMIT BUTTON	
12	1	CA06304000	COMPONENT - SWITCH PLATE	
13	1	SEE RM	HYDRAULIC SYSTEM	SEE NOTE
14	4	0001500007	SCR-HHC-MS - M10 X 1.5 X 16MM	
15	4	0001500009	WASHER LOCK - M10	
16	1	FS/FS	PLATE - LIMIT SWITCH - ANOUNT	
17	4	0001510005	WASHER LOCK - M5	
18	4	0001500008	M5 - .8 X .45 MM LONG	
19	3	0001500015	M6 - 1.0 X .76 MM LONG	
20	2	0001510006	WASHER PLAIN - M5	
21	1	C77-4254	ACTIVATOR-LIMIT SWITCH	
22	1	0001500005	SCR-HHC-MS - M8 - 1.0 X 20MM	
23	1	0001510009	NUT-HEX - M6	



# PARTS LISTS AND DRAWINGS

## SECTION 8-5

*Parts Identification Drawing No. 348185  
(Sheet 1 of 1)*

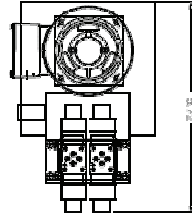
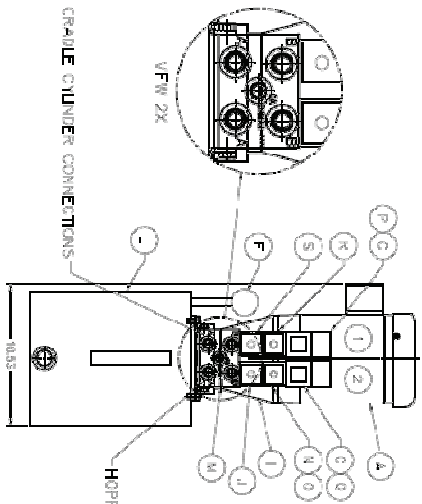
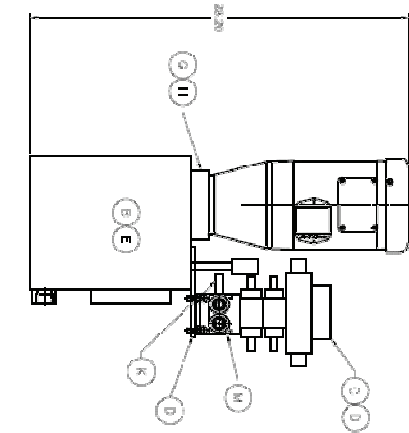


NOTE:  
REFER TO CROSS SECTIONAL DRAWINGS 48020  
FOR LOGE CUTTING CHAMBER IDENTIFICATION.  
REFER TO DRAWING 38070 FOR HYDRAULIC  
POWER UNIT IDENTIFICATION.

# PARTS LISTS AND DRAWINGS

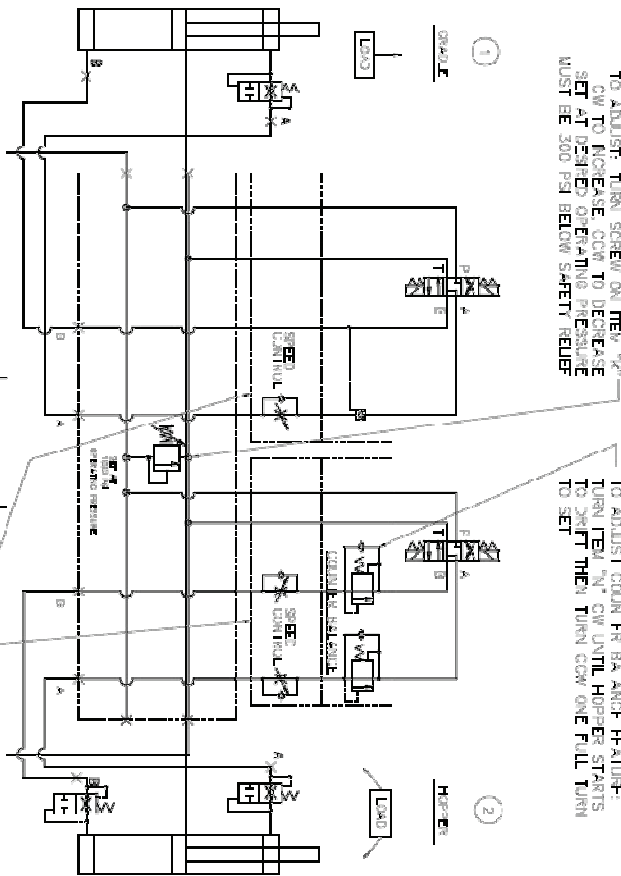
## SECTION 8-6

Parts Identification Drawing No. 1554-460  
(Sheet 1 of 1)



ITEM NO.	DESCRIPTION	QTY	UNIT
1	HOOPER CYLINDER	1	EA
2	HOOPER CYLINDER	1	EA
3	HOOPER CYLINDER	1	EA
4	HOOPER CYLINDER	1	EA
5	HOOPER CYLINDER	1	EA
6	HOOPER CYLINDER	1	EA
7	HOOPER CYLINDER	1	EA
8	HOOPER CYLINDER	1	EA
9	HOOPER CYLINDER	1	EA
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45	HOOPER CYLINDER	1	EA
46	HOOPER CYLINDER	1	EA
47	HOOPER CYLINDER	1	EA
48	HOOPER CYLINDER	1	EA
49	HOOPER CYLINDER	1	EA
50	HOOPER CYLINDER	1	EA

ITEM NO.	DESCRIPTION	QTY	UNIT
1	HOOPER CYLINDER	1	EA
2	HOOPER CYLINDER	1	EA
3	HOOPER CYLINDER	1	EA
4	HOOPER CYLINDER	1	EA
5	HOOPER CYLINDER	1	EA
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48	HOOPER CYLINDER	1	EA
49	HOOPER CYLINDER	1	EA
50	HOOPER CYLINDER	1	EA



TO ADJUST: TURN SCREW ON ITEM 17  
CW TO INCREASE CCM TO DECREASE  
SET AT DESIRED OPERATING PRESSURE  
MUST BE 300 PSI BELOW SAFETY RELIEF

TO ADJUST COUNTER BALANCE FEATURE:  
TURN ITEM 18 CW UNTIL HOOPER STARTS  
TO SHIFT THEN TURN CCM ONE FULL TURN  
TO SET

SPEED CONTROLS  
TURN CW TO SLOW CYLINDER  
MOVEMENT IF DESIRED  
ITEMS 19 AND 20  
TO ADJUST: REMOVE HEX CAP ON  
ITEM 19. TURN SCREW CW TO  
INCREASE CCM TO DECREASE SET  
300 PSI ABOVE DESIRED OPERATING  
PRESSURE

HYDRAULIC RESERVOIR TO



RECOMMENDED GRANULATOR MOTOR BRANCH-CIRCUIT SHORT-CIRCUIT PROTECTION PER THE  
1996 NEC CODE BOOK RULES  
FOR STANDARD EFFICIENCY MOTORS\* (NEMA DESIGN B,C,&D)

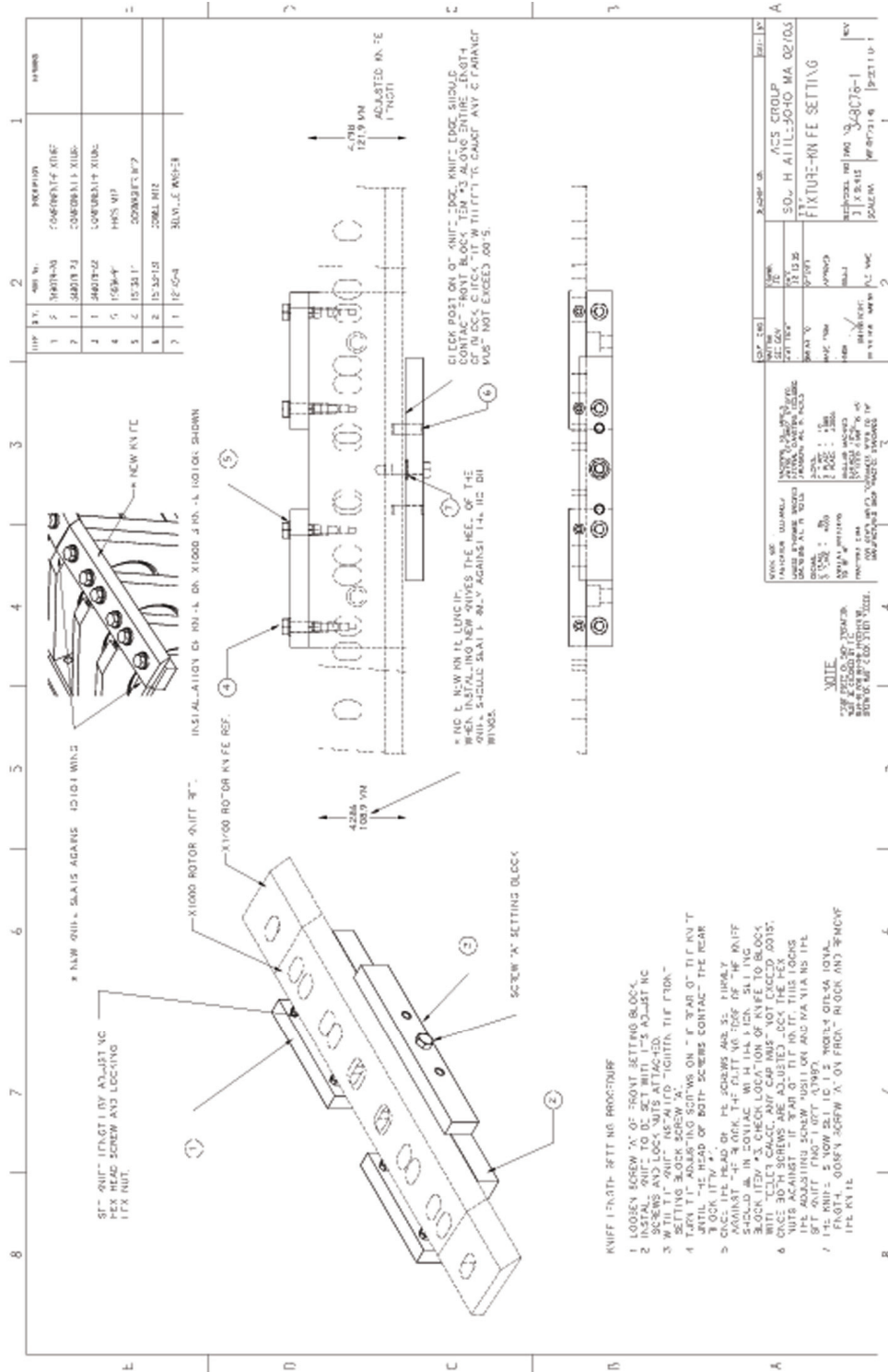
HORSEPOWER	VOLTAGE	TIME DELAY FUSES	CIRCUIT BREAKER		MOTOR CIRCUIT PROT.	
			AUTO TRANS	ACROSS THE LINE	AMP RATING	TRIP RANGE
50	200	300A	400A	400A	400A	875-1750A
	208	250A	400A	400A	400A	875-1750A
	230	250A	350A	350A	250A	625-1250A
	460	125A	175A	175A	100A	300-1000A
	575	100A	150A	150A	100A	300-1000A
60	200	350A	450A	450A	400A	875-1750A
	208	300A	450A	450A	400A	875-1750A
	230	300A	400A	400A	400A	875-1750A
	460	150A	200A	200A	150A	450-1550A
	575	125A	175A	175A	100A	300-1000A
75	200	400A	600A	600A	NOT RECOMMENDED	
	208	400A	500A	500A	NOT RECOMMENDED	
	230	350A	500A	500A	NOT RECOMMENDED	
	460	175A	250A	250A	250A	500-1000A
	575	150A	200A	200A	150A	450-1550A
100	200	500A	800A	800A	NOT RECOMMENDED	
	208	500A	700A	700A	NOT RECOMMENDED	
	230	500A	600A	600A	NOT RECOMMENDED	
	460	225A	350A	350A	400A	625-1250A
	575	200A	250A	250A	150A	450-1550A
125	200	600A	800A	800A	NOT RECOMMENDED	
	208	600A	800A	800A	NOT RECOMMENDED	
	230	500A	800A	800A	NOT RECOMMENDED	
	460	300A	400A	400A	400A	875-1750A
	575	225A	300A	300A	400A	625-1250A
150	200	800A	1200A	1200A	NOT RECOMMENDED	
	208	800A	1000A	1000A	NOT RECOMMENDED	
	230	700A	1000A	1000A	NOT RECOMMENDED	
	460	350A	500A	500A	400A	1000-2000A
	575	300A	400A	400A	400A	625-1250A
200	200	1000A	1400A	1400A	NOT RECOMMENDED	
	208	1000A	1400A	1400A	NOT RECOMMENDED	
	230	800A	1200A	1200A	NOT RECOMMENDED	
	460	450A	600A	600A	NOT RECOMMENDED	
	575	350A	500A	500A	NOT RECOMMENDED	
250	200	1200A	2000A	2000A	NOT RECOMMENDED	
	208	1200A	2000A	2000A	NOT RECOMMENDED	
	230	1200A	1600A	1600A	NOT RECOMMENDED	
	460	500A	800A	800A	NOT RECOMMENDED	
	575	400A	600A	600A	NOT RECOMMENDED	
300	200	1500A	2000A	2000A	NOT RECOMMENDED	
	208	1500A	2000A	2000A	NOT RECOMMENDED	
	230	1200A	2000A	2000A	NOT RECOMMENDED	
	460	650A	1000A	1000A	NOT RECOMMENDED	
	575	500A	800A	800A	NOT RECOMMENDED	

\* FOR ENERGY EFFICIENT MOTORS AND OTHER SPECIAL TYPES OF MOTORS CONSULT FACTORY FOR PROPER SIZING OF DISCONNECTS SWITCHES.

WHEN CONTROLS ARE FURNISHED BY THE CUSTOMER, CUMBERLAND BEARS NO RESPONSIBILITY OF IMPROPER SIZING OF DISCONNECT SWITCHES AND STARTERS UNLESS THE CUSTOMER REQUESTS MOTOR INFORMATION AND/OR ASKS FOR ENGINEERING ASSISTANCE IN SELECTING THE PROPER DISCONNECTS AND STARTERS.

# PARTS LIST AND DRAWINGS

SECTION 8-8  
 Drawing No. 348078-1  
 (Sheet 1 of 1)



QTY	PART NO.	DESCRIPTION	REVISION
1	348078-01	COMPONENTS KIT	
1	348078-02	COMBINATION KNUF	
1	348078-03	COMBINATION KNUF	
1	348078-04	COMBINATION KNUF	
1	348078-05	COMBINATION KNUF	
1	348078-06	COMBINATION KNUF	
1	348078-07	COMBINATION KNUF	
1	348078-08	COMBINATION KNUF	
1	348078-09	COMBINATION KNUF	
1	348078-10	COMBINATION KNUF	

- KNIFE LENGTH SETTING PROCEDURE
1. LOOSEN SCREW 'A' OF FRONT SETTING BLOCK.
  2. POSITION SCREW 'A' TO THE POSITION OF THE SCREWS AND LOCK NUTS ATTACHED.
  3. WITH THE KNIFE ASSEMBLY IN THE FRONT SETTING BLOCK, CHECK LOCATION OF KNIFE TO BLOCKS.
  4. CHECK THE POSITION OF THE SCREWS ON THE REAR SETTING BLOCK.
  5. CHECK THE HEAD OF THE SCREWS ARE FIRMLY AGAINST THE BLOCKS. CHECK THE POSITION OF THE SCREWS ON THE REAR SETTING BLOCK.
  6. CHECK THE POSITION OF THE SCREWS ON THE REAR SETTING BLOCK. CHECK THE POSITION OF THE SCREWS ON THE REAR SETTING BLOCK.
  7. THE KNIFE IS NOW SET TO THE CORRECT POSITION. THE KNIFE IS NOW SET TO THE CORRECT POSITION.

QTY	PART NO.	DESCRIPTION	REVISION
1	348078-11	FIXTURE-RN FE SETTING	
1	348078-12	FIXTURE-RN FE SETTING	
1	348078-13	FIXTURE-RN FE SETTING	
1	348078-14	FIXTURE-RN FE SETTING	
1	348078-15	FIXTURE-RN FE SETTING	
1	348078-16	FIXTURE-RN FE SETTING	
1	348078-17	FIXTURE-RN FE SETTING	
1	348078-18	FIXTURE-RN FE SETTING	
1	348078-19	FIXTURE-RN FE SETTING	
1	348078-20	FIXTURE-RN FE SETTING	

NOTE: THE KNIFE IS NOW SET TO THE CORRECT POSITION. THE KNIFE IS NOW SET TO THE CORRECT POSITION.

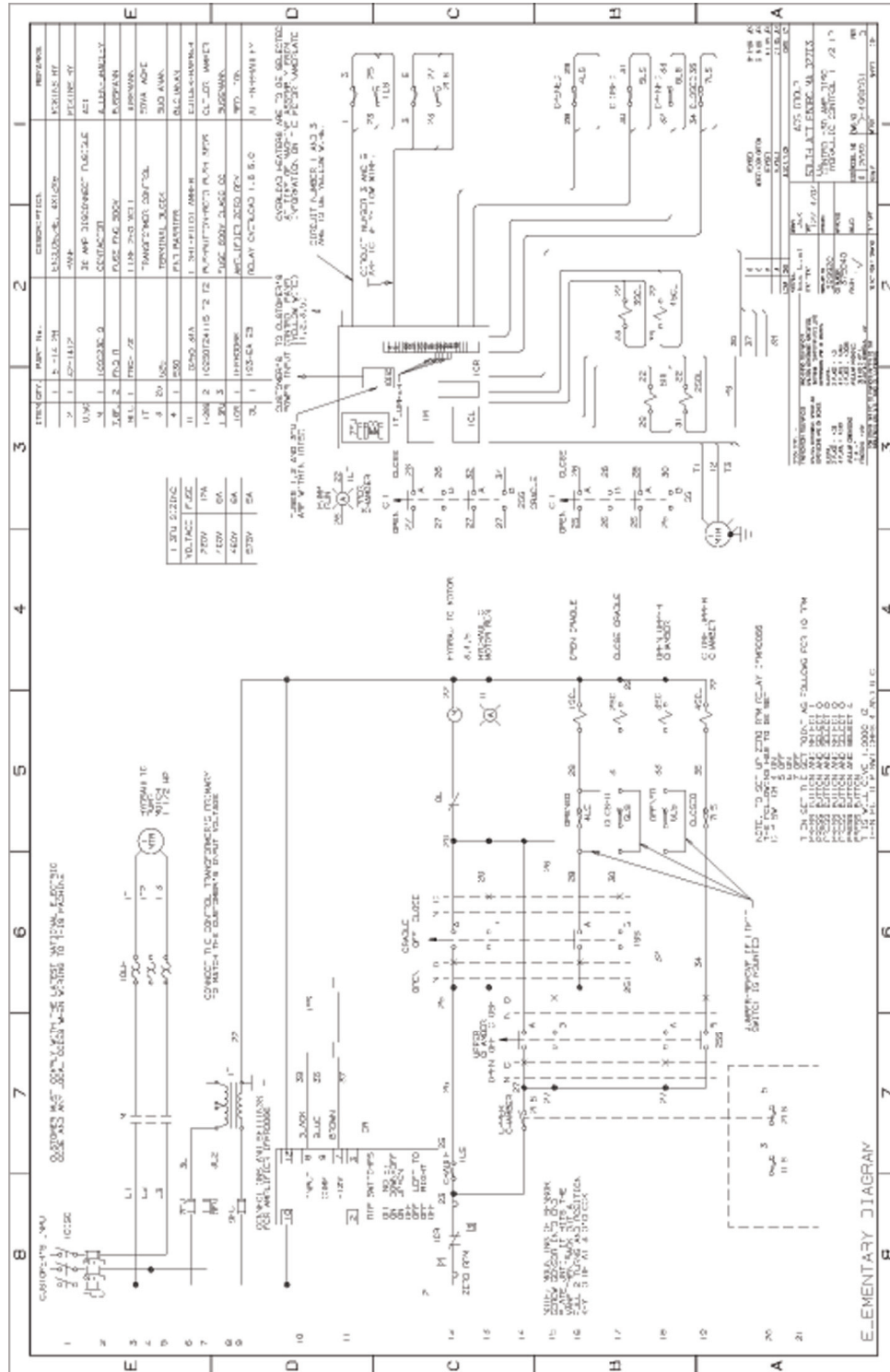
DATE: 10/15/54  
 BY: J. W. BROWN  
 CHECKED: J. W. BROWN  
 APPROVED: J. W. BROWN

# PARTS LIST AND DRAWINGS

## SECTION 8-9

Wiring Diagram for Hydraulics Drawing No. D-499061

(Sheet 1 of 1)

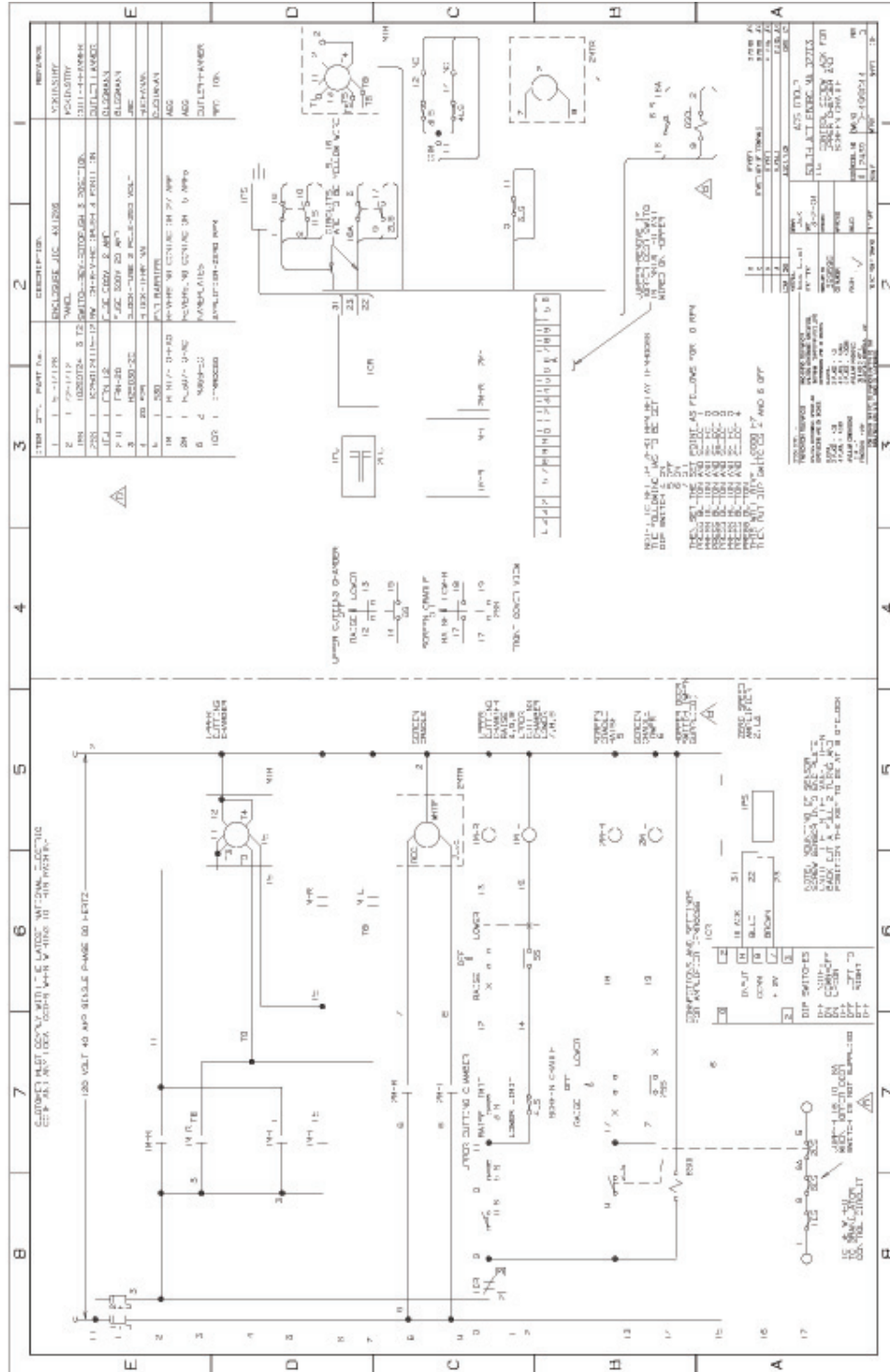


# PARTS LIST AND DRAWINGS

## SECTION 8-10

Wiring Drawing No. D-499044

(Sheet 1 of 1)



METRIC KNIFE BOLT/SCREW TIGHTENING TORQUE SPECIFICATIONS  
 FOR GRADE 10.9 FINE THREADS, UNLUBRICATED CONDITIONS

SCREW SIZE	TIGHTENING TORQUE	
	LBS. FT.	NM.
M8	28	38
M10	54	73
M12	100	135
M14	155	210
M16	232	315
M18	340	460
M20	472	640
M24	810	860

APPLICABLE MODELS

6x8	18x24	30T
8x12, All models	18x36	56T
4x6	X700	
12x12 All models	X1000	
12x15 All models	X1400	
284	1456	
384	1462	
484	12x6 Marathon	
584	12x8 Marathon	
684	12x12 Marathon	
1426I	12X16 Marathon	



